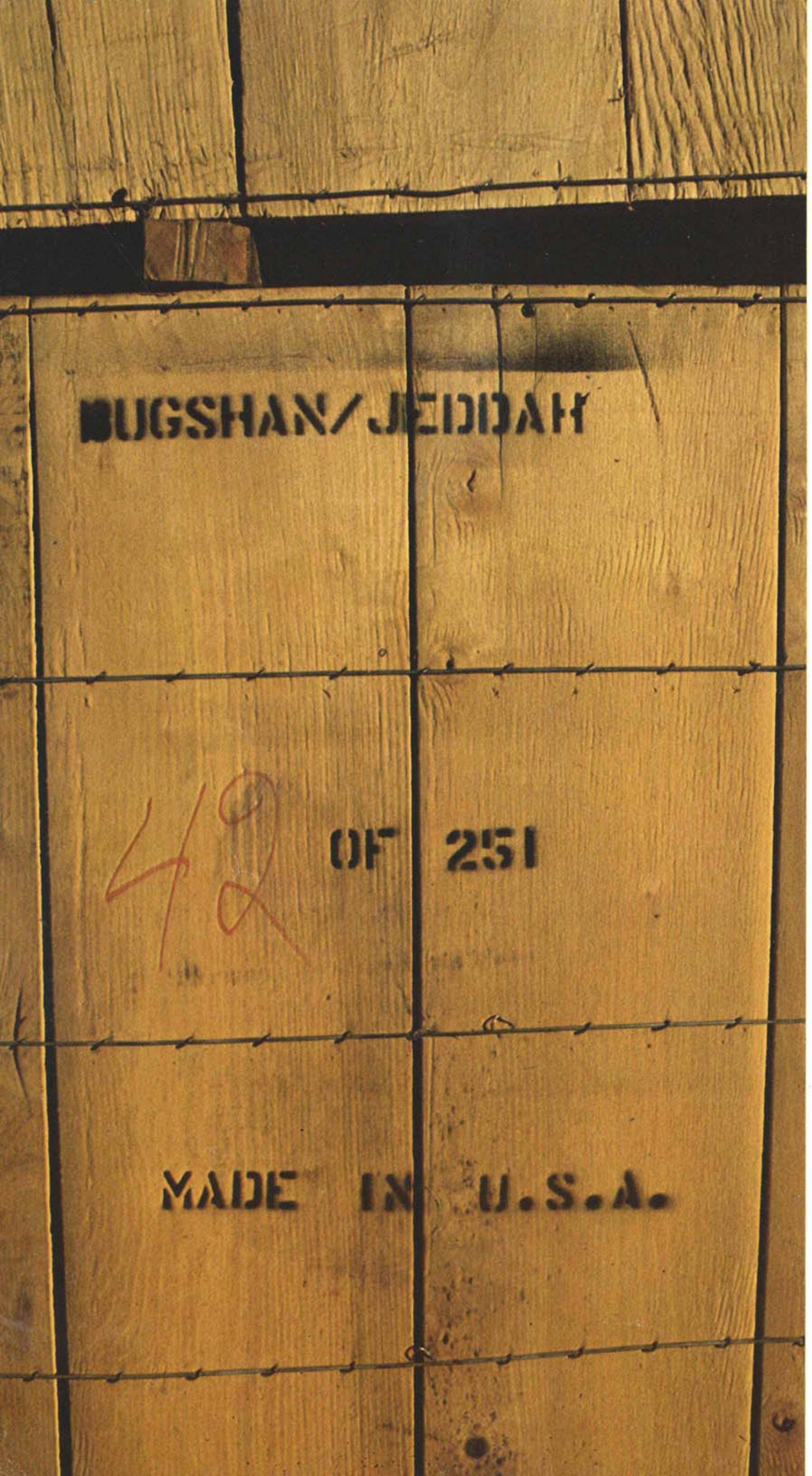

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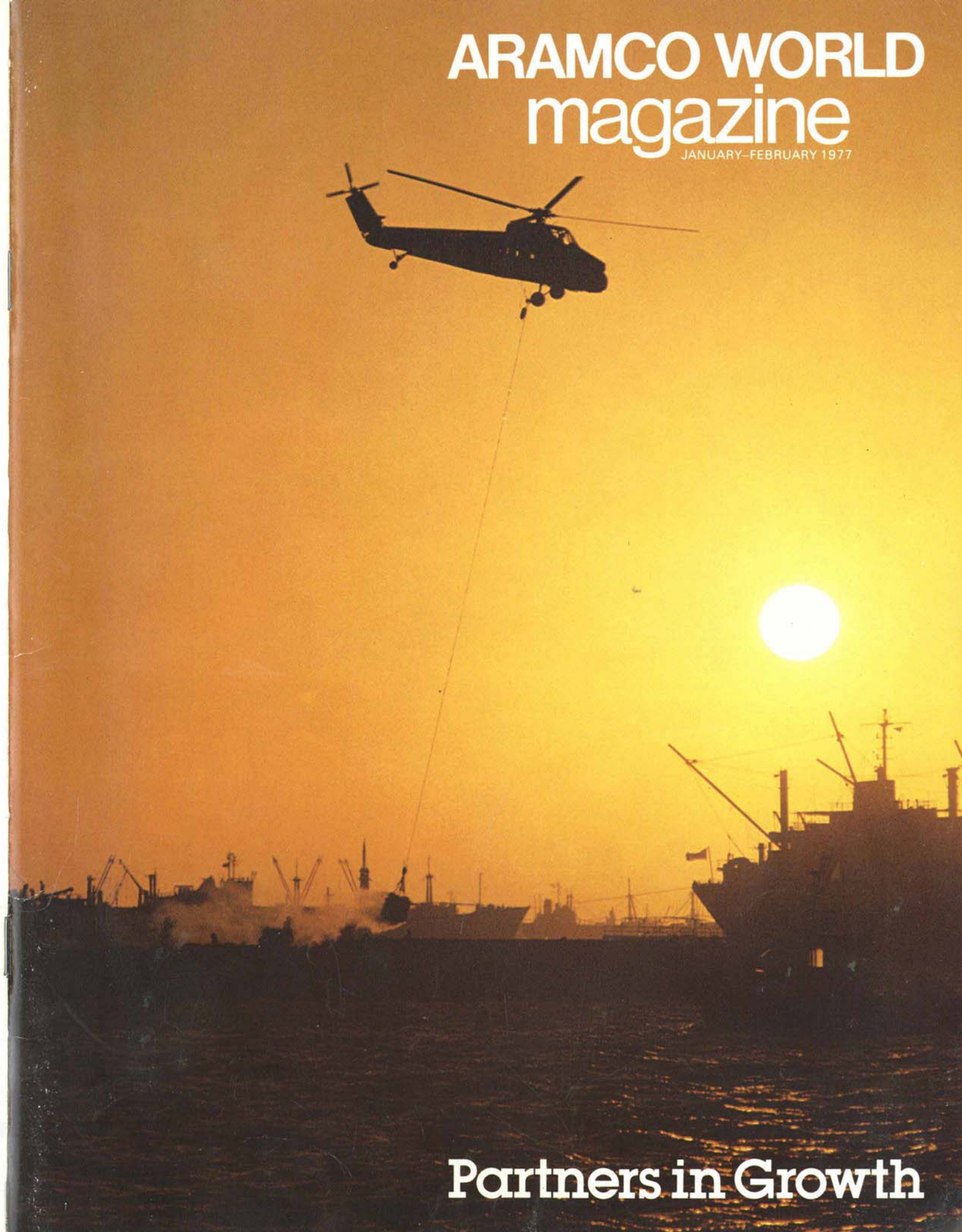

Partners in Growth

ARAMCO WORLD magazine

VOL 28 NO 1 PUBLISHED BIMONTHLY JANUARY–FEBRUARY 1977

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Contributors to this issue include Philip Harsham, a veteran reporter, editor and free-lance magazine writer who, for this issue, covered the United States; Robert Arndt, formerly a free-lance writer based in Istanbul, now a staff writer for *Aramco World Magazine,* who covered Saudi Arabia; and John Lawton, a UPI correspondent for 14 years now covering Turkey and the Middle East for newspapers and magazines, who covered the Gulf.

Photographers for this issue are Burnett H. Moody, Aramco's chief photographer; Tor Eigeland, a frequent contributor to the *National Geographic,* and *Aramco World Magazine;* and Katrina Thomas who photographed *Aramco World's* special issue on Arab women.

Additional research for this issue was provided by Larry E. Bagnoli of the Public Relations staff and economists William L. Hostetler, S. R. Keeley, W. L. Littlejohn and J. C. Story. Also contributing research was Beatrice Rieser in New York.

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Cover: By introducing radical new cargo handling methods – such as the unloading of critical materials by helicopter at Jiddah – Saudi Arabia, by February, had virtually eliminated waiting time at its busy and previously clogged harbors. Photo by Burnett H. Moody.

◀ In Houston, Texas, Bechtel Corporation engineers have built an exact-scale model of the 800-megawatt Ghazlan power plant to be constructed on the east coast of Saudi Arabia.

Partners in Growth: An Introduction

The Arabs, with their taste for metaphor, have an expression they find very useful: "The sands are blowing." It is a way of saying that time is marching on; that change comes with time; that change, in short, is inevitable.

Today, in the Arab world, that saying is particularly apt. The sands *are* blowing. Change *is* inevitable. Change of staggering magnitude and incalculable impact as Arab countries from North Africa to the Arabian Gulf launch monumental efforts to transform their often rudimentary economies into full-blown industrial states.

Behind those efforts is a cooly pragmatic assessment of the facts of life today. In early 1977, for example, Saudi Arabia owned 110 billion barrels of proved oil reserves—easily 22 percent of the free world's oil reserves—and thus, it would seem, has no need for other sources of income or any other economic base. But like a billionaire worrying about his health, Saudi Arabia is concerned about over-reliance on oil. Saudi Arabia knows that world demands could, and may, deplete even its vast reserves in a relatively short time. Its leaders know too that some alternatives to oil already exist and that others may be perfected in the not-too-distant future. Saudi Arabia, therefore, and other Arab countries have begun to prepare for the future. In recent years they have been increasingly investing their earnings in industrial projects and infrastructures in order to diversify their economies and reduce their dependence on oil.

The investments are being made on an almost unimaginable scale. Even in such small states as Abu Dhabi, Dubai, Qatar and Kuwait they are measured in billions and in Saudi Arabia are larger yet. In Saudi Arabia, for example, the government has earmarked $143 billion to, in effect, develop the kingdom. That's $143 *billions*—an amount sufficient to quadruple American per capita expenditures on hospital care in 1975.

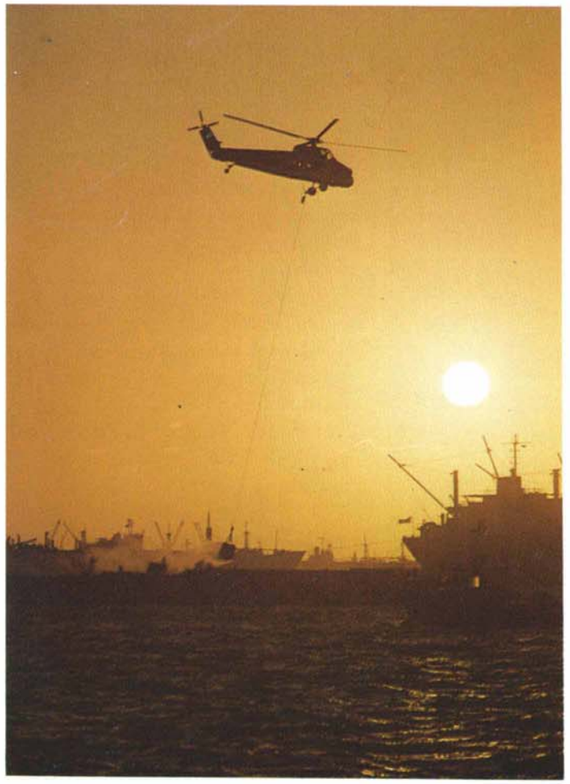
On the Arabian Peninsula, development on that scale means imports. Virtually everything needed must now be imported or, if it is to be supplied locally, the facilities for its production must be imported. Even labor must be imported—because of the size of the undertakings and the relative smallness of the labor force—particularly the trained technological labor necessary for the development programs.

For the world's industrialized nations, therefore, the sands blowing in the Middle East offer unprecedented opportunities. The Arab world's almost unlimited appetite for staggering quantities of industrial commodities and services—from computers to cracking columns, design data to deep-sea diving—are injecting billions of dollars into the world's anemic economic bloodstream, swelling cash flows into corporate and national treasuries and, as one effect, providing salaries and wages, dividends and taxes.

The cash, of course, flows two ways. Partly as a result of the rise in oil prices in the early 1970's, payments by the industrialized world to the Arab oil countries and other members of the Organization of Petroleum Exporting Countries (OPEC) increased tremendously. The United States, for example, imported $5.85 billion worth of oil from Saudi Arabia in 1976—more than three times the amount for 1974—while sales of American goods to Saudi Arabia in the same period totaled $2.77 billion, a merchandise trade surplus for Saudi Arabia of $3.08 billion.

Such surpluses, now being enjoyed by Saudi Arabia and other oil exporters, have generated sufficient funds to allow them to embark on industrialization and development programs. These programs, in turn, are providing opportunities and markets for the already industrialized nations and the result has been intense competition for industrialization contracts.

At the beginning of the competition many Americans assumed that the United States had the inside track in Saudi Arabia. Remembering that Aramco—owned by four major American oil companies—had discovered and developed the enormous Saudi Arabian oil reserves, and that thousands of Saudi students had been educated in schools, colleges and universities throughout the United States, they assumed that Saudi Arabia would naturally turn to the United States for the help needed to transform the kingdom. They knew too that the U.S. Army Corps of Engineers had been commissioned by the Saudi government to supervise construction of billions of dollars worth of facilities. Last, they remembered that both governments had formed the U.S. Saudi Arabian Joint Commission on Economic Cooperation to allow Saudi Arabia to draw on American expertise on economic development matters.



All of which is perfectly true. Saudi ties with the United States are old and still strong. Yet it does not, in sum, mean that the United States has the inside track.

Because of their years of experience in Saudi Arabia some American companies do have a slight competitive edge. And because of their American training and education many Saudi government officials and prominent Saudi businessmen do feel more comfortable working with American companies and using American-built machinery and parts. But that's as far as it goes. The Saudi government—and those charged with carrying our their plans—cannot, today, be concerned with inside tracks. They want, quite simply, results. Any company which offers advantages in price, quality or timing, therefore, can win a contract—and many European and Asian companies already have. Easily a quarter of the Saudi projects being administered by the U.S. Army Corps of Engineers, for example, have been won by non-American contractors.

In many ways, in fact, it was the non-American companies that had an edge. Governments in Europe, Britain and Asia—notably Japan and South Korea—often put up financial guarantees and performance bonds required by the Saudi government, while American companies had to look after their own up-front financial needs. Until recently, bonding stipulations were sometimes enough to knock Americans right out of the competition. Americans, moreover, are often handicapped by restrictions that might change United States-Arab trade relations and seriously hamper American efforts to win a share in the ambitious industrialization programs.

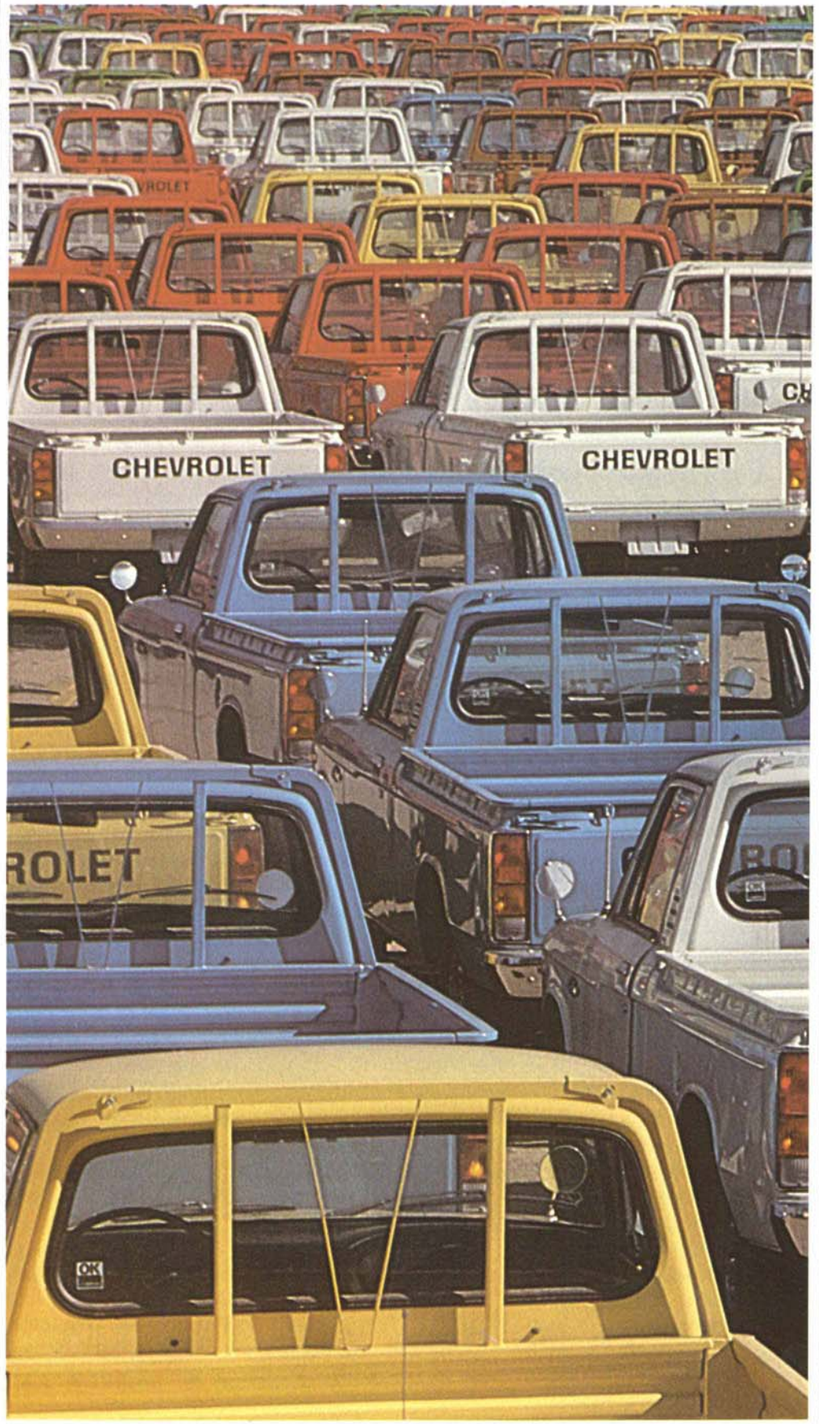
American companies, however, have not thrown in the towel yet. If they're losing some contracts, they're winning others and, all the while, are keeping an eye on the even more staggering opportunities which lie ahead—opportunities that, in-kingdom studies say, could be worth $80 billion to contractors alone.

To trace the full impact of such amounts on an economy as big and as complex as the American economy is, of course, difficult. For although such payments may seem to sustain just the fortunate firms that win contracts, the benefits in fact seep into the economy of the country: from contractor to sub-contractors, sub-contractors to suppliers, suppliers to factories, mines and farms. At each step those payments create or sustain jobs that in turn generate wages to pay rents and mortgages, buy groceries at the supermarket, reduce the loan on last year's new Chevy, correct a daughter's overbite, or put a son through college, thus providing income to landlords, bank tellers, grocers, car dealers, dentists and bursars. Like stones thrown in a pond, such contracts send ripples in all directions and are almost untraceable.

On the pages that follow, nevertheless, our contributors will try to suggest the extent of the impact. For if the sands are blowing in the Middle East—and they are—the impact is being felt throughout the world, not least in the United States.

— The Editors

Partners in Growth: The Gulf



The Arab East is the fastest growing market in the world for Western goods, services and technology. Its ports are awash with imports, its cities are jungles of construction, and its governments are handing out contracts like newsboys selling extras. As one diplomat put it, never have so few people tried to invest so much money so profitably in so short a time.

To the United States this has been beneficial. During 1975, for example, when total world trade tumbled five percent, business in the Middle East climbed by 15 percent and in 1976 the United States alone sold $7 billion in goods and services to Arab countries.

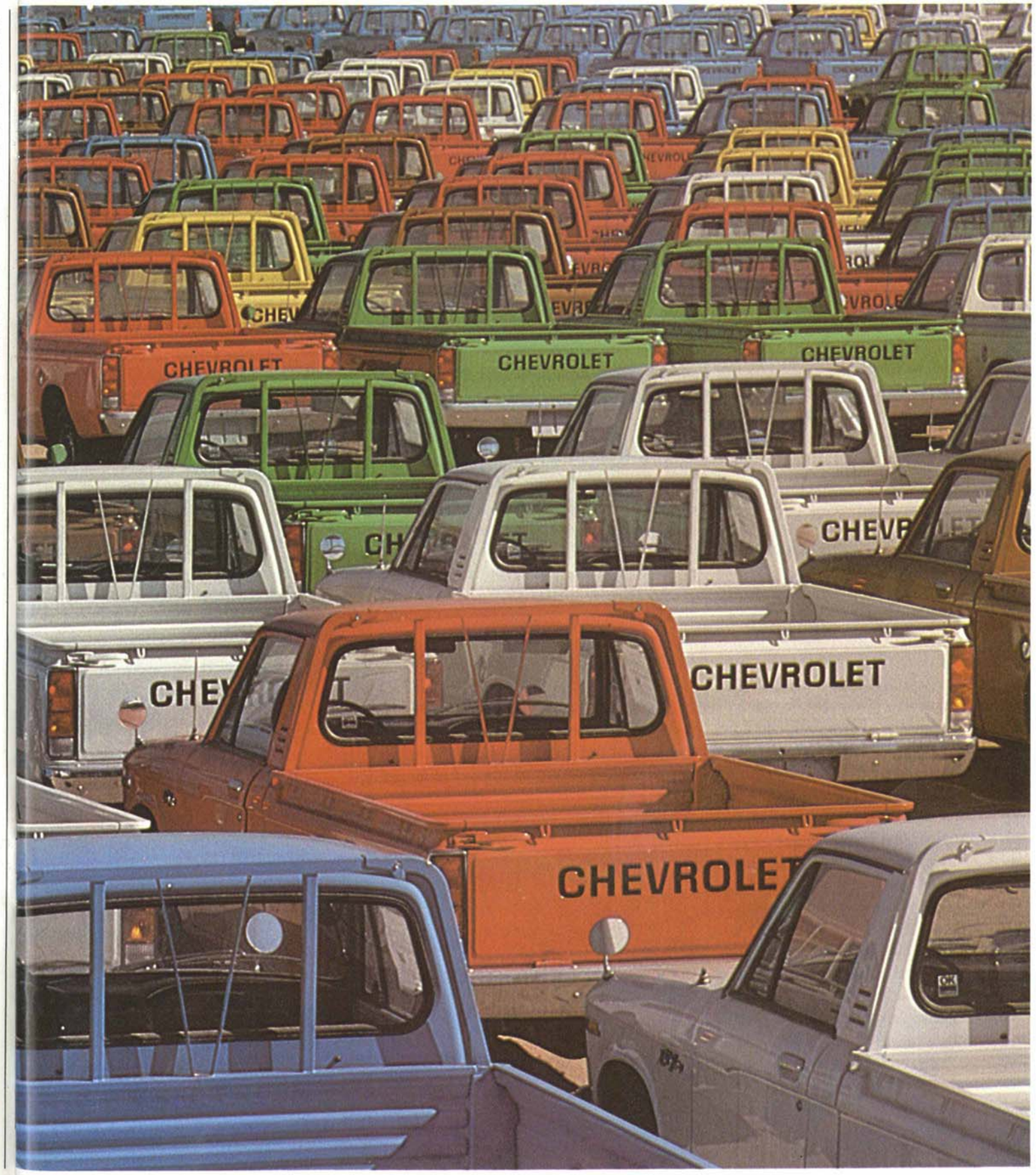
The future, moreover, seems equally bright. With billions of dollars earmarked for capital expenditures, economists predict exceptional opportunities for foreign businessmen willing and also able, to do business with the Arab countries.

There is, of course, no guarantee that American business and industry will continue to share in the boom. According to both Arab and American spokesmen, restrictions—which could seriously affect U.S.-Arab trade—have sent a wave of concern sweeping through the American business community in the Arab world. As one U.S. contractor put it, "The Arabs like our goods, but not our restrictions".

Some American businessmen, in fact, have hesitated to bid on important projects—because of uncertainties about possible restraints. As a result, foreign competitors in many areas are flourishing.

At the moment, however, American businessmen and industrialists are still trying—and still hoping—particularly those who have entered the lists in countries such as Abu Dhabi, Dubai, Kuwait, Qatar and Sharjah where, a recent survey shows, the stakes are high and the combatants numerous.

...never have so few people tried to invest so much money so profitably in so short a time.



Altogether, construction work worth about $2 billion is underway with another $600 million worth under consideration.

Abu Dhabi. "Compared to here," said Norman L. Richardson, gesturing towards Abu Dhabi's scaffolding-draped skyline, "construction in the United States is penny ante stuff. Abu Dhabi has money and the Abu Dhabians are willing to spend it."

Richardson should know. His firm, C. & O. Developing Co. of South Kenly, North Carolina, has just completed Abu Dhabi's first government owned hotel, the Ramada Airport Inn.

"They asked for an all-American hotel and we gave it to them," Richardson said. "Everything, including the bricks, came from the United States."

By "everything," Richardson did mean everything. Knapp of Phoenix, Arizona made the bar, Thomasville Furniture of North Carolina made the beds, Triangle Brick of Durham, North Carolina made the bricks, Nello L. Teer of Durham did the building, J. G. Hopkins of Roanoke, Virginia the plumbing, and Ramada, which will manage the hotel, the engineering and design. "Altogether, 600 American subcontractors and suppliers were involved and revenue for the States totaled $10 million."

And that sum, Richardson went on, does not include the $1,000-a-week wages for 75 Americans brought to Abu Dhabi to do the skilled work—wages which were apparently both needed and appreciated. "I've had calls from those who went home. They're begging to come back. They can't find jobs in the States."

Two Alabama competitors, who joined forces to tackle a venture in Abu Dhabi, have a similar story to tell. Faced with declining revenues during the U.S. recession, Harbert Construction Corp. of Birmingham, Alabama, and the Paul N. Howard Co. of Greensboro, North Carolina, decided to stop competing and start cooperating. As a result they won a $50-million contract to build a three-lane pipeline that today carries drinking water from a desalination plant to Abu Dhabi City.

As another result they kept the employees of the American Cast Iron Pipe Company of Birmingham, Alabama, busy for months manufacturing 68 miles of pipe, the largest single consignment —five shiploads—ever handled by the Port of Mobile.

And there may be more to come. Having completed the job almost one year ahead of schedule, Harbert-Howard expect to win another $45-million contract to lay pipe to the inland town of al-Ain.

"It's one of those American success stories," says Daniel Dolan of the U.S. Embassy in Abu Dhabi. "It proves that not only the big multinationals, but small firms too can succeed in business in the Middle East."

As in other countries of the Arabian Gulf, Abu Dhabi, the major partner in the United Arab Emirates, is spending substantial portions of its oil earnings

—more than $5 billion a year—in the United States and, as a result, providing jobs from Massachusetts to Minnesota. In early 1977, for example, S. J. Groves and Sons of Minneapolis, Minnesota, was building roads, Bechtel of San Francisco, California was building an airport and The Architects Collaborative (TAC) of Cambridge, Massachusetts was designing a public library in Abu Dhabi and a hospital in al-Ain.

As American contractors almost invariably choose American machinery and vehicles, such contracts generate sales and jobs in the United States. "You use what you are familiar with," says George M. Meyer, area manager of Harbert-Howard, who bought $2.5 million worth of Caterpillar, Koering and General Motors vehicles and equipment to complete their pipelaying contract. And this, in turn, boosts U.S. exports, currently topping $500 million a year to the United Arab Emirates.

Future possibilities, furthermore, are "staggering," according to Francis X. Crowley, president of the Natgun Corp., water-tank builders in Wakefield, Massachusetts. As an example, Crowley listed the results of a visit to the Emirates in January by a 12-man U.S. trade mission. In three days it made $5.2 million in direct sales and reported $48.4 million worth of projected business during the next 12 months.

"It was the most successful U.S. trade mission ever to visit the Emirates," says Dolan. "It was way off the chart." The Emirate traders were so keen to do business with the United States, he went on, that one of the delegation who was too ill to fulfill appointments "just lay on his bed all day taking orders."

During the same visit Oman sent three senior government representatives to Abu Dhabi for the first-ever contact with a U.S.-Government-sponsored trade mission. Even Iraq, which stopped buying American goods following the 1967 Arab-Israeli War, gave the delegation a red-carpet reception.

Not all of Abu Dhabi's plans are firm, of course, but those that are,

according to the U.S. State Department, "offer significant opportunities to U.S. businessmen, particularly planners, architects and builders."

That would seem to be the case already. In 1976, says chief city planner Dr. Azmi Abu Taleb, more than 400 construction licenses were granted for multistory blocks. And even now buildings are sprouting skyward—the houses, apartments, offices, schools, hospitals, mosques and hotels that are turning the scorched little island into a mini-Manhattan.

Dubai. As in Abu Dhabi, the skyline of Dubai is showing the effects of growth. Along the fast straight road to the famous Dubai Creek last month, a forest of cranes at Jabal Ali outlined a new port, a vast industrial complex and—limned by saucer-shaped antennae—a satellite communications center. Nearby there was also a towering concrete shell showing the location of Dubai's 33-story trade center. When completed, it will be the tallest building on the Gulf.

There were other signs of growth too. On the creek where, in earlier times, seamen sailed off to the Indian Ocean, trading dhows and service vessels for American offshore oil rigs inched past a Greek cruise ship that had just opened as a floating hotel—and was already full. Not far away, taxis fought their way toward the 700-bed Inter-Continental where harried businessmen hustled off to one of Dubai's 30-odd banks, including Citibank and Chemical from New York and the First National Bank of Chicago.

Growth, in fact, is the name of the game in Dubai and American companies seemed to be doing most of the growing. On the lower part of the creek, for example, a Sheraton hotel was rising against the skyline and an American-made drilling platform was moving out to sea; enroute the platform passed what will be the world's largest dry dock, also a brainchild of U.S. technology.

The dry dock, which will be able to provide repair and maintenance work on several large ships simultaneously, typifies the opportunities open to American companies throughout the Middle East. Another American company hopes to land the contract to manage it.

But there are numerous other examples as well. One is the $765-million, 74-berth port being built nine miles north of Dubai City. A second is the projected industrial complex at Jabal Ali. It will include a $500-million aluminum smelter—with 7.5 percent of it owned by the Southwire Corp. of Atlanta, Georgia, a company that will also provide technology in construction. Also planned for the complex is a $394-million gas-liquefaction plant for which Hudson Engineering of Houston, Texas, will provide engineering, equipment and design. Altogether, construction work worth about $2 billion is underway with another $600-million worth under consideration.

Contracts of those magnitudes are not easy to come by and for the United States they mean jobs. Most of the jobs are in U.S. production and design centers, but some of them are right in Dubai itself. J. Ray McDermott & Company, Inc. of New Orleans, Louisiana, maintains a 650-man work force of Americans in the Middle East, half of them in Dubai—and needs them. In 1976, according to Charles L. Davies, group vice-president, the McDermott Company won $200 million in offshore construction work in the Arab world, much of it done in McDermott's 80-acre construction yards on the bank of the Creek.

In Dubai, however, construction is not the whole scene. For Dubai also has plans to develop as a financial center of United Arab Emirates, and as the U.A.E. Eurodollar and dollar investments already total nearly $7 billion, there are almost unlimited opportunities for U.S. bankers, according to J. C. Green, an American working with the Commercial Bank of Dubai. "There is a tremendous demand for corporate finance, term credits and the more sophisticated banking services," he said.

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Along the Gulf, the signs of growth are obvious: the cranes and buildings (below) that fill Kuwait's skyline. Other examples: two American hotels (1) a Hilton and (2) a Ramada Inn where (3) Edward Clark of Roanoke, Virginia works on the inn's light fixtures; (4) A water-pipe project being executed by two firms from North Carolina and Alabama, all in Abu Dhabi; (5) and (6) the construction yards where the J. Ray McDermott and Company of New Orleans builds oil rigs (7) an American-designed dry dock which will be among the world's largest, both in Dubai; (8) the Citibank building and (9) a new Sheraton, also in Dubai; (10) Seatrain containers in Sharjah.

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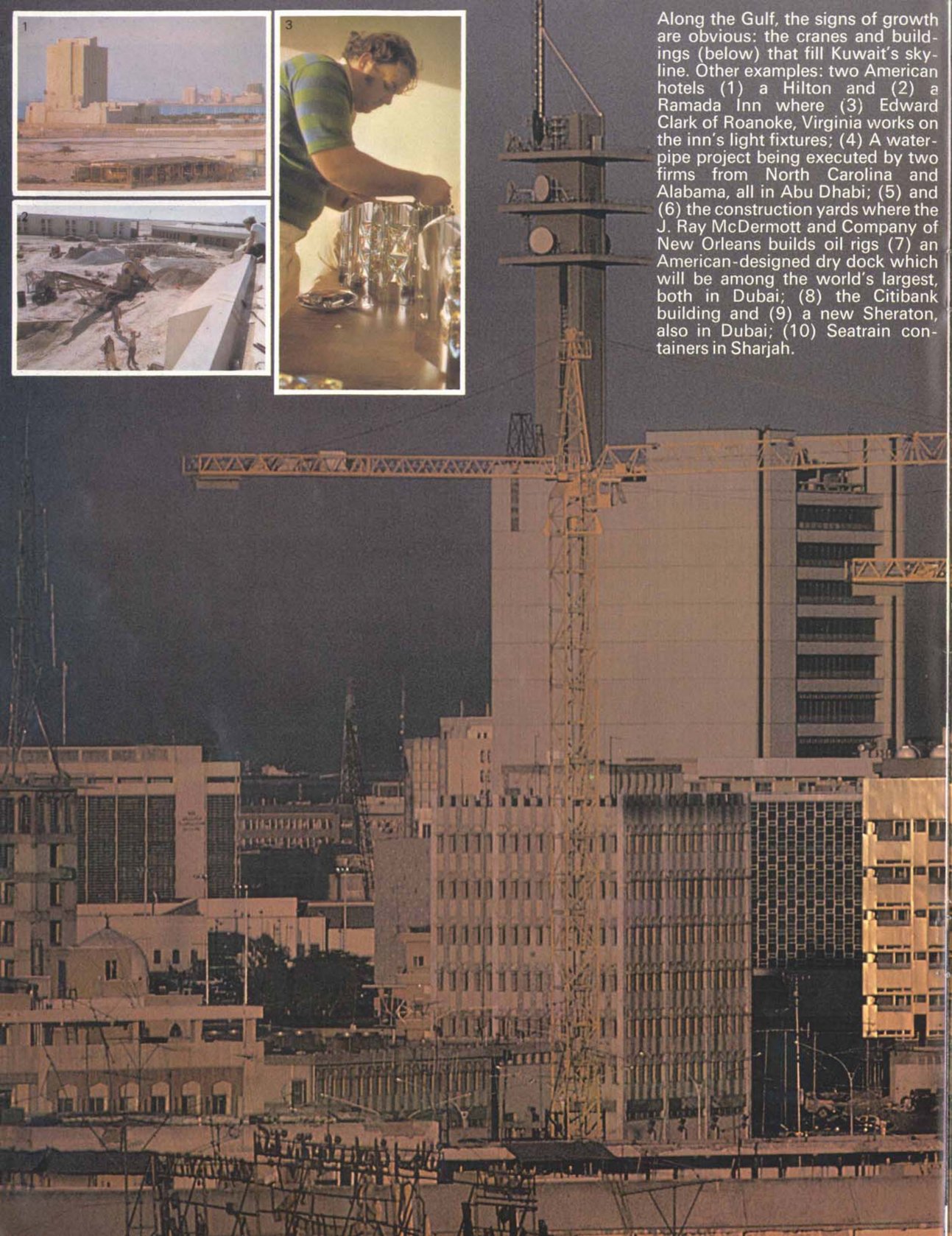
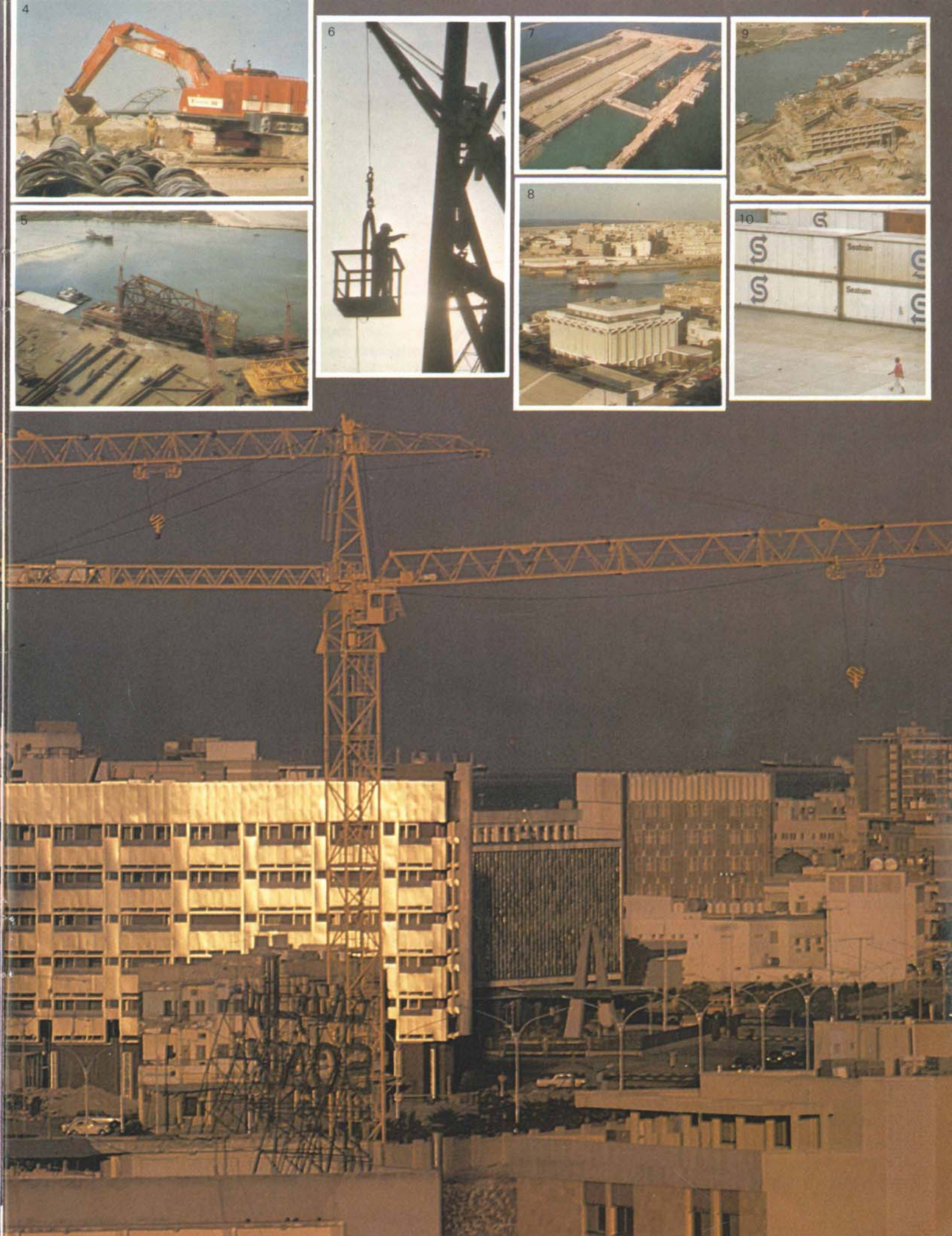




There is virtually no limit to what American businessmen could do in Kuwait.

Kuwait. At first glance attractive opportunities seemed equally available in Kuwait last month. In the kilometer-square grounds of Kuwait City's Salim al-Ali center, for example, the hot Arabian sun glinted off the gleaming coachwork of the 6,000 brand new American automobiles parked wall-to-wall in the center's parking lot.

"We sold 16,000 of them last year," said Suhail al-Haraish of Yousuf A. Alghanim and Sons, the largest General Motors dealer in the world. "And this year," he said, waving toward a convoy of new Chevrolets pulling into the lot, "we should sell more."

With an $8-billion-a-year income from oil—plus interest on its petrodollar investments—Kuwait is one of the more attractive markets in the Gulf for American-made goods. Indeed, since the Middle East development programs began, U.S. exports to Kuwait—of everything from Sara Lee cakes to Boeing jet liners—have shot up 400 percent and in 1976 topped $414 million.

In addition, scores of U.S. construction firms, employing hundreds of American architects and engineers, are contributing to the vast development program that is transforming Kuwait from an ancient fishing and trading community into a modern, industrialized state.

Altogether more than 60 U.S. companies—including Bechtel, Honeywell, Otis and Merrill Lynch—have permanent offices in Kuwait to handle a wide variety of important—and profitable—projects. They include hospitals (Perini Corp.), housing (Perkins & Will), airport facilities (Stanray and FMC), a municipal fish market (Marcel Breuer), highways (DeLeuw, Cather) and a Disneyland-style amusement park (VTN). Recent orders placed by Kuwait with U.S. firms total $370 million. They are: Kellogg International—$250 million for a natural-gas processing plant; Foster-Wheeler—$70 million for oil refinery expansion; General Electric—$40 million for gas turbine engines; Parker Drilling Company—$10 million dollars to drill a 20,000-foot deep test well in the Burgan oil field.

And even that is just part of the picture.

Kuwait Airways operates a jet fleet of seven Boeings—all built by U.S. craftsmen—and is considering buying more. In addition, 80 percent of all the construction equipment used by the Ministry of Public Works is manufactured in U.S. plants—along with the parts Kuwait will need in years to come.

...Since the Middle East development programs began, U.S. exports to Kuwait–of everything from Sara Lee cakes to Boeing Jet Liners –have shot up 400 percent.

For Americans, still shaken by the soaring and still uncertain unemployment figures of the recent recession, such statistics are unquestionably encouraging. But there are, according to U.S. officials in Kuwait, clouds on the horizon.

One is the alarm about new U.S. restrictions on trade. Like Arabs in the U.A.E. and Saudi Arabia, the Kuwaitis fear that artificial restraints will disrupt U.S.-Kuwait trade relations. Already, in fact, the previous tide of American businessmen pouring into Kuwait has slowed—apparently because of uncertainties in the U.S. about future American trade relations with the Arab world.

Another cloud is competition—especially from Europe and Japan. Across town from Alghanim's wall-to-wall Chevrolets, astute Kuwaiti salesmen, untroubled by any uncertain trade policies, display hundreds of Toyotas that, their signs suggest, they would be very pleased to sell to would-be GM customers. And atop Kuwait City's high-rise apartments, commanding neon signs tell Kuwait that companies like Sony of Japan and Philips of Holland are quite eager to sell Kuwait whatever they might need.

In 1975 American businesses and industries had begun to improve their position in Kuwait. Admittedly, they were still a long way from matching Europe's nine Common Market countries—who provided a whacking 38 percent of all Kuwait imports. But for the first time in a decade American exports to Kuwait had outstripped those of Japan—18 percent to 16.2 percent.

And the future, say U.S. officials, was looking even better. Past and present U.S. earnings from Kuwait are peanuts, they claim, compared with future prospects. The billion-dollar construction boom in Kuwait, for example, will probably last for decades. In short, a U.S. State Department spokesman put it, "There is virtually no limit to what American businessmen could do in Kuwait."

The key word there, of course, is "could." Because, as one observer added, "If U.S.-Kuwait trade relations go sour for any reason, there's damned few imports that Kuwait can't get somewhere else and other countries—such as Japan or Britain—would be only too willing to provide them."

And Doha, the capital boasts such American institutions as a branch of New York's Citibank...and even a Colonel Sanders' 'finger-lickin' good' fried chicken emporium.

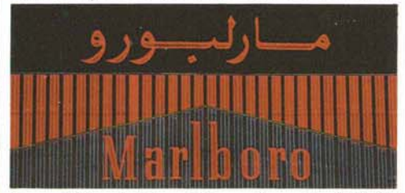
Qatar. In Qatar that has already happened. For nowhere is the cut and thrust of competition for Arab petrodollars more plainly illustrated than in the foreign trade figures of Qatar, where the United States, Great Britain and Japan jockey for supremacy in import league standings.

In 1974, Japan ousted Britain as Qatar's major foreign supplier and relegated the United States, previously the runner-up, to third place. Britain bounced back in 1975—capturing 21 percent of Qatar's total imports to Japan's 15 percent—but the United States, with 12 percent, stayed where it was.

In absolute terms the figures on U.S. exports to Qatar might not seem discouraging. In 1975 they increased 80 percent: to $50 million, mainly in sales of cigarettes, automobiles and heavy equipment. And Doha, the capital, boasts such

American institutions as a branch of New York's Citibank, a fully automated AMF bowling alley and even a Colonel Sanders' "finger-lickin' good" fried chicken emporium. It will also soon have a pyramid-shaped Sheraton on its white-sanded shores.

American firms, moreover, are actively participating in, or bidding for, multi-million dollar contracts arising from the small shaikhdom's billion-dollar-a-year development program. Price International of Bartlesville, Oklahoma, for example, is coating sections of a 222-mile natural-gas pipeline, William F. Pereira of Los Angeles, California is planning a prestigious new suburb at the end of Doha Bay. And The Architects Collaborative of Cambridge, Massachusetts (TAC) is competing for a $105 million building contract.



American companies are also involved in, or bidding on, even bigger projects. One is a $260-million university. Another is a $2.6-billion industrial complex rising like a mirage from Qatar's eastern seaboard salt flats at Umm Said which will include petrochemical facilities, a steel mill and an aluminum smelting plant.

Nevertheless, U.S. officials in Qatar are worried. Sent to Doha two years ago, when the United States first opened an embassy in Qatar, they had hoped to improve U.S. trade. But so far, Qatar's import figures show, other countries are doing better.

They asked for an all-American hotel and we gave it to them. Everything, including the bricks, came from the United States.

One reason, according to Kamal Ali Saleh, the director general of the Qatar

Chamber of Commerce, is that British and Japanese businessmen are often more aggressive and flexible than their American counterparts. "We had lots of visits by U.S. trade delegations, but no follow-up," Saleh says. "Some U.S. companies just have a take-it-or-leave-it attitude."

U.S. Ambassador Robert Paganelli agrees. "Some American businessmen think they can sell anything here at any price on any terms. In actual fact, the Qataris are extremely price and quality conscious and competition is fierce."

Another reason is that although Qatar businessmen and officials are favorably disposed to American products and technology, they know—and make it plain—that Qatar can survive without U.S. trade.

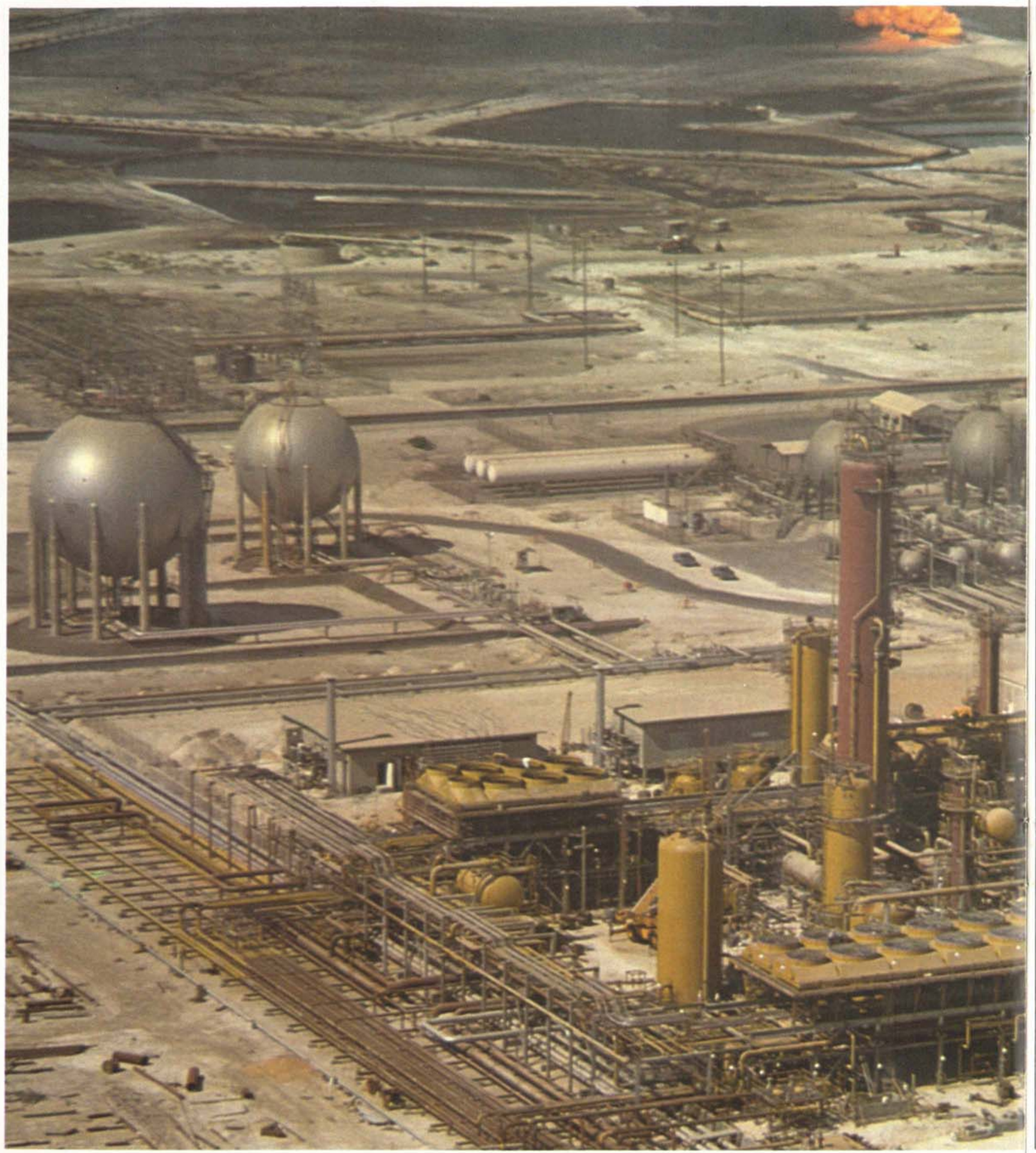
Continued trade with the Arab states is more in America's interest than ours...

"Continued trade with the Arab states is more in America's interest than ours," says Mohammad Shabana Ali, economic adviser to the Ruler of Qatar.

That situation, they conclude, plus changes in U.S. attitudes toward U.S. firms doing business with the Arabs, could leave the U.S. in third place—or lower—for years to come, at least in Qatar and possibly, they imply, the entire Arab world.

Partners in Growth: Saudi Arabia

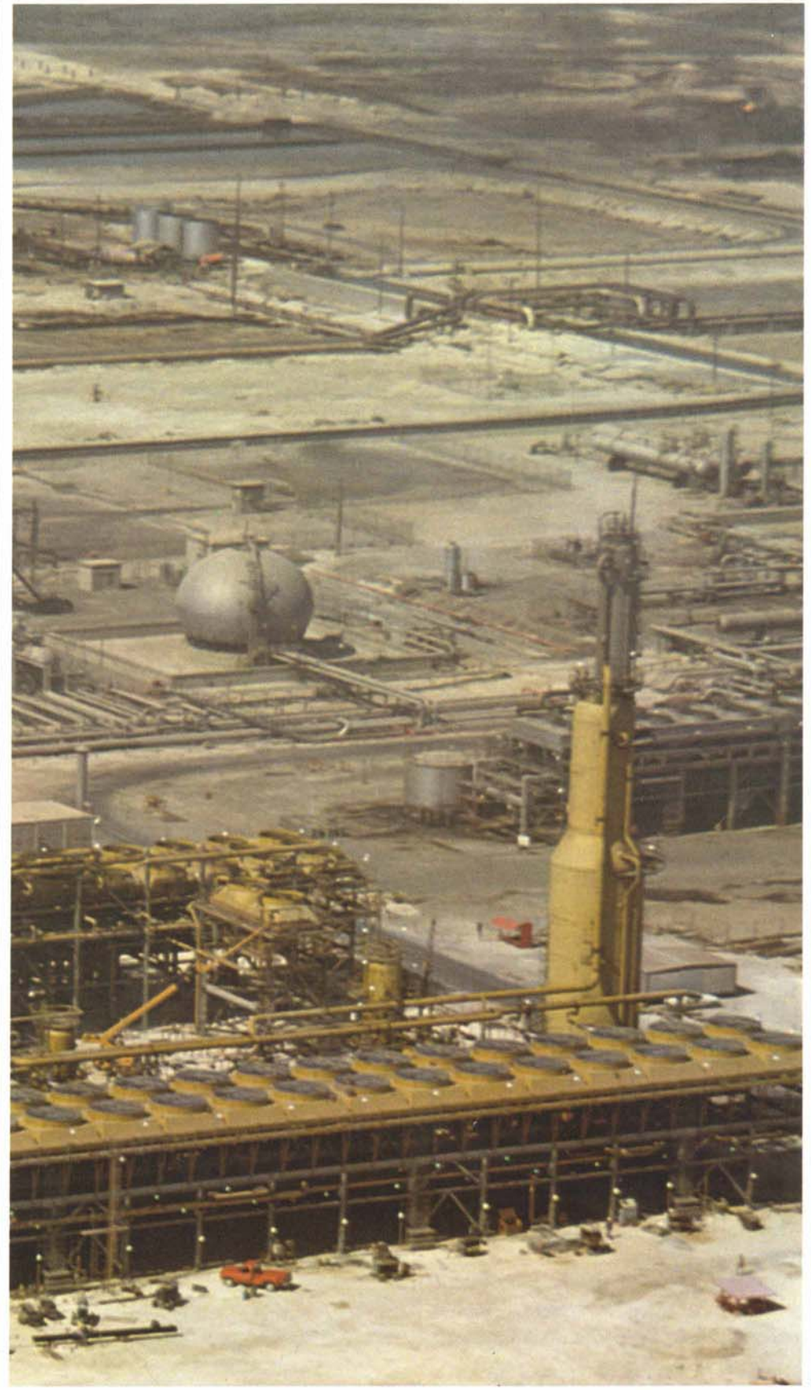
When completed Saudi Arabia will ... harness six billion cubic feet of gas a day ... enough to fuel nearly half the gas-using homes in the United States.



In statistical terms, Saudi Arabia's massive $143-billion industrialization and development program is unquestionably one of the most ambitious any nation has ever undertaken. Some examples:

- Approximately $93 billion is earmarked for kingdom-wide projects – a sum that is more than *double* the amount America spent on the entire Apollo Space Program, with its 18 space-shots and six manned landings on the moon.
- A major airport planned for Jiddah, one of three to be constructed, will occupy an area about the size of Manhattan.
- Proposed construction will require close to two million man-years of construction labor, 63 million cubic yards of asphalt, 80 million cubic yards of concrete aggregate and three *billion* concrete blocks.
- The SCECO power-generation system will, by 1982, have a capacity of 5,800 megawatts – nearly three times the present consumption of Los Angeles—and its 2,949 miles of circuits would stretch from Boston to San Francisco.
- In 1976, shipping charges for just Aramco-managed projects totalled $96 million, up six times over the amount spent in 1974. Costs for urgent air shipments for the same projects—enough, roughly, to fill 147 Boeing-707 cargo jets—came to $14 million.

The program, to be sure, is ambitious in other terms too; its high-priority construction of houses, hospitals and schools is no less than an attempt to guarantee shelter, health and education to every one of the kingdom's seven million citizens. Essentially, though, the development plan is a blueprint for an enormous infrastructure—a term that aptly describes the plan's first goal: something to build on, or with, in the future.



To provide that infrastructure, Saudi Arabia has begun to import immense quantities of goods from the already industrialized countries—most notably the United States. In 1976 alone, for example, nearly $740 million in American-made goods—ranging from 320-ton boilers to 208,000 cans of potato chips—were shipped to Saudi Arabia for just Aramco projects. In so doing the Kingdom has also begun to expand an informal but durable economic partnership dating back to May 29, 1933.

On that date Saudi Arabia granted an American company exclusive oil rights in an area measuring 500,000 square miles—the first step toward the discovery of the vast oil reserves from which the kingdom, today, is supplying steadily mounting percentages of the world's energy. It was also the first link in a strong economic chain forged during the ensuing 43 years—a chain that is already worth billions of dollars to the United States and promises to be worth far more in the future.

One of the key links, of course, was Aramco, the company that would eventually develop the kingdom's oil and—in the 1970s—take charge of the great gas-gathering project that is at the heart of the development program.

The gas-gathering project is actually the largest project the petroleum industry has ever tackled. It will include, initially, construction of major gas processing centers—at Shedgum, Uthmaniyah, Ju'aymah and Berri—which will remove contaminants and produce ethane, methane, propane and butane, and will be connected through 2,500 miles of pipelines to storage tanks, fractionation plants, refineries and shipping terminals. When completed, Saudi Arabia will have the capacity to harness six billion cubic feet of gas a day—enough to fuel nearly half the gas-using homes in the United States. The gas-project will also provide raw material and fuel for the attendant hydro-carbon-based industrial complexes at Jubail and Yanbu'. And it will also, because the companies most closely involved are American, channel substantial benefits into the United States.

Some companies from the United States have already benefited—particularly those in the construction industry and its suppliers. For in the plan's early phases construction is big business. Out of the $143 billion allocated to the development plan some $79 billion is specifically earmarked for construction projects. That sum includes $9 billion for education—including the construction of 2,000 new schools; $8 billion for housing—including the construction of 175,000 houses, enough to shelter more than 10 percent of the population; $3 billion for the construction of 50 new hospitals and 575 dispensaries; $13 billion for municipal drainage systems, sewer systems and street paving; $3 billion for new highways; $3 billion for airports; $2.5 billion for new seaports and

> *...because the companies most closely involved are American, channel substantial benefits into the United States.*

port expansion; $10.5 billion for electrical power generating and water desalination plants; and $20 billion for industrial plants.

Recent in-kingdom studies show that total expenditures for projects—plus the private sector's spending—come to a staggering $115 billion which will generate some $80 billion in payments to construction contractors and $68 billion in construction-related imports.

One important sector of the Saudi development plan is the enormous airports program under which Saudi Arabia will build three major airfields. All are to be designed and constructed to American specifications.

It is easy, in discussing the development of Saudi Arabia, to take superlatives in stride. But the new Jiddah airport—which the Ralph M. Parsons company of Pasedena, California is managing in a joint venture with Daniel International of Greenville, North Carolina—is something else. "In land occupied, it will be about the size of Manhattan Island," a senior Parsons executive says without batting an eye. "And in terms of air-traffic and plane-handling facilities, it will compare to the new Dallas-Ft. Worth airport. Except that it will cost an estimated $4.6 billion."

Like the Jiddah seaport, the Jiddah airport plan has grown in size with the Saudi Government's increasing emphasis on caring for the Hajj traffic—the annual inflow of up to two million Muslims a year making a pilgrimage to nearby Mecca. There will be, for example, a special terminal for Hajj traffic and an airport mosque.

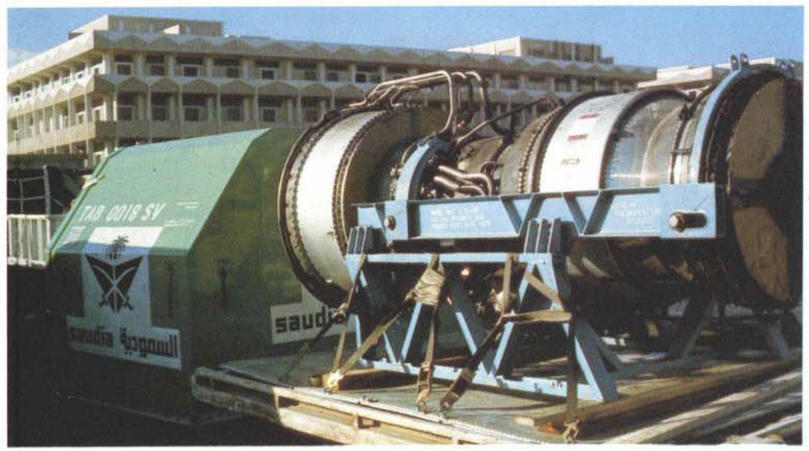
At Riyadh, the capital city of Saudi Arabia, the new airport will also include a mosque—a mosque large enough to accommodate 8,000 worshippers. The third airport, to serve the oil-industry center of Dhahran on the Arabian Gulf, was originally supposed to simply expand the existing American-designed facility. Indications now, however, are that an entirely new field will be built.

Whether American companies will win further contracts for such projects is, of course, uncertain. But at the moment the Americans do have one advantage over eager competitors from other nations: the 43 years of association in which American firms were forging strong commercial links in the kingdom. In the 1930s, for example, and, thereafter, Aramco's oilmen naturally called for, and were shipped, American materials and equipment; as Americans, they knew the names, quality and specifications of American brands. And because the purchasing offices that supported them were in the U.S.A., this preference for "buying American" was passed on to the Saudi Arabs who worked with the Americans and who eventually set up supply businesses or industrial operations on their own.

"Our first customers were Americans and they, of course, wanted American goods—or else they specified according to American standards," says one Saudi heavy-equipment dealer who remembers those days. "Either way, it came to the same thing: most of our equipment was American. Because of that, our Saudi customers came to know and value those brands, and preferred them over others they weren't so familiar with."

That, to be sure, is changing. Saudi businessmen are as sophisticated as any in the world and, as a result, American products and technology now have to prove their worth over and over again against mounting competition. Even so, hundreds of U.S. firms today are involved in large numbers of projects currently under way in the kingdom.

In storage areas around Jiddah, goods such as air-conditioning units, refrigerators, washers and driers, turbines, heavy duty tires—and one incongruous Wurlitzer organ—are kept in storage areas until importers and trucking firms assign vehicles to move them to warehouses, shops, homes and jobsites.



Some of those companies are the experienced multinational firms which have always worked abroad. But some are small, imaginative or innovative firms which have never worked in foreign countries—but whose new contracts in Saudi Arabia sometimes exceed the value of their previous annual turnover.

Their projects are varied, ranging in scale from single villas to whole industrial cities and in cost from about $100,000 to almost $10 billion each. They include feasibility studies, engineering and architectural design, project management and construction. Aramco alone has contracts totalling more than $2.8 billion with American firms and individuals.

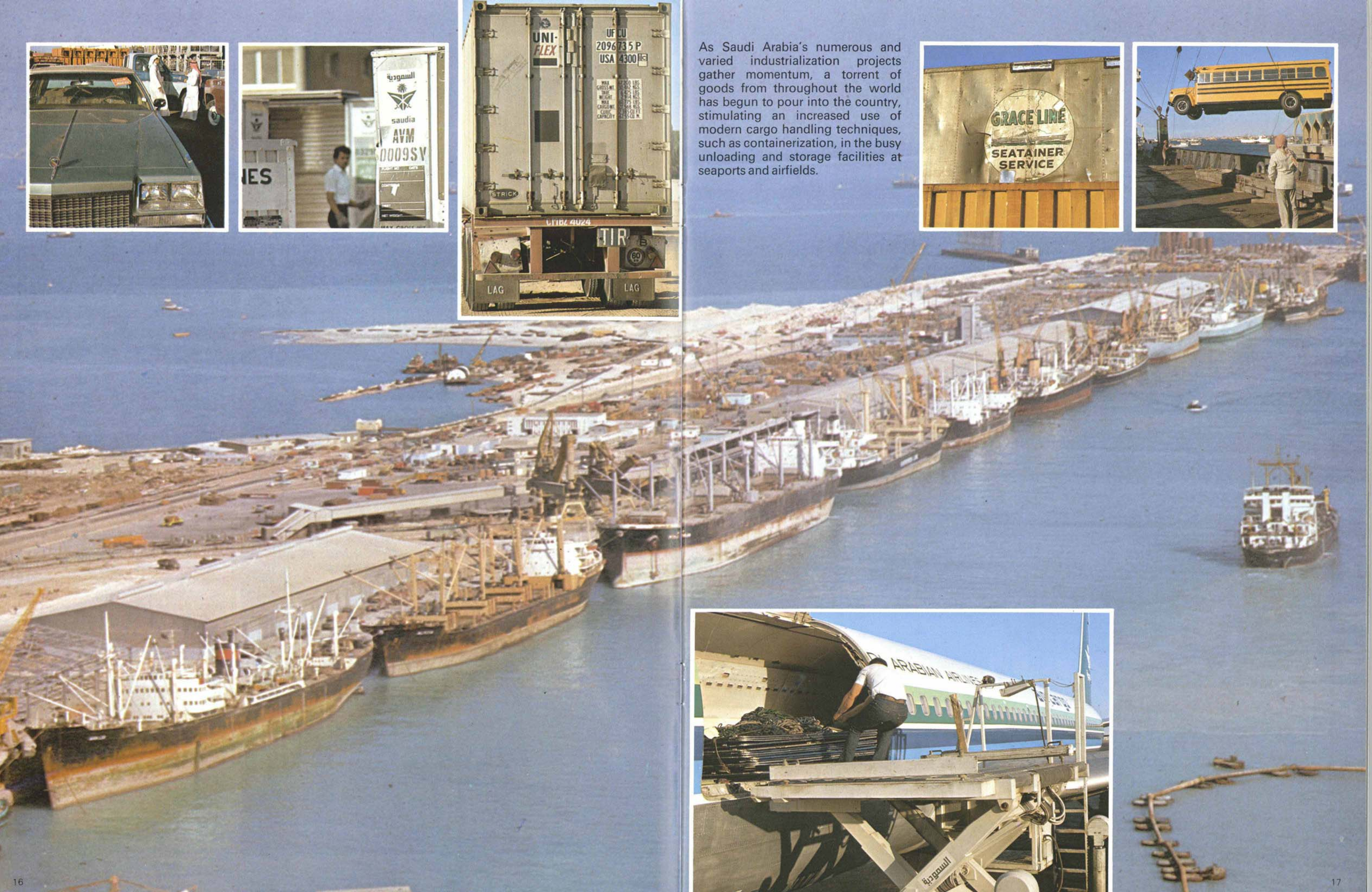
But the main focus is construction, particularly on the east and west coasts where the kingdom's industrialization programs are concentrated. On the west coast, for example, a dozen wholly owned or partly owned American companies

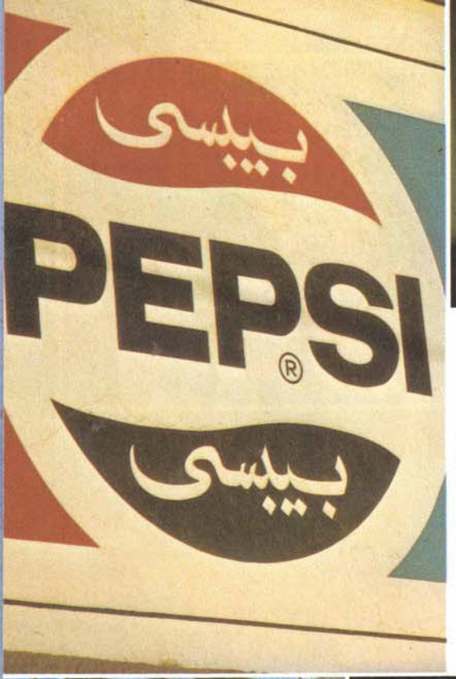
> *A major airport planned for Jiddah ...will occupy an area about the size of Manhattan.*

figure prominently among the 200 companies that are handling 85 percent of the work there. Altogether, American firms handled about seven percent of all construction work done on both coasts in 1975 and 1976.

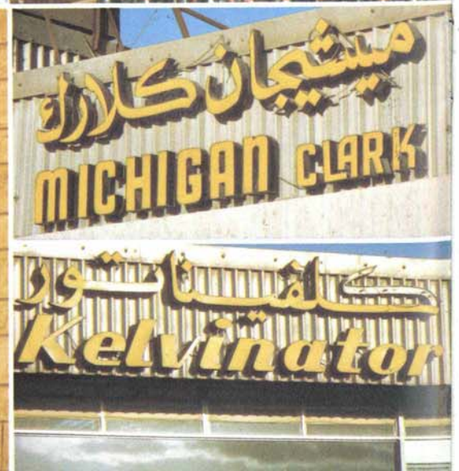
J. A. Jones Company of Charlotte, North Carolina, may be representative of the American construction firms working in the kingdom. The company entered the Saudi market in August 1974, won the first job it bid on and now has contracts for about $385 million worth of construction, including some $100 to $110 million with Aramco and a portion of the rest with the U.S. Army Corps of Engineers which oversees some $18 billion worth of contracts for the Saudi Arab Government. The company em-

As Saudi Arabia's numerous and varied industrialization projects gather momentum, a torrent of goods from throughout the world has begun to pour into the country, stimulating an increased use of modern cargo handling techniques, such as containerization, in the busy unloading and storage facilities at seaports and airfields.





Familiar signs and trademarks on walls, windows and rooftops in the now-sprawling metropolis of Jiddah suggest the numbers and kinds of American companies which have established a presence in Saudi Arabia since the kingdom's five-year-plan signalled the start of a massive and costly effort to transform the entire kingdom into a economically sophisticated state.



ploys 230 Americans in the kingdom and its total work force, of 2,600 men, is still growing.

J. A. Jones has worked abroad since the 1930's but never on this scale. "We now have in the kingdom more assets than we've ever put into a country outside the United States," says vice-president George Turner. "We probably have equipment here with an acquisition cost of $12 million, and another $3.5 million worth of land and facilities. Ninety-nine percent of that equipment is American."

Furthermore, Turner says, J. A. Jones, in the past two years, has imported "in excess of $100 million worth of materials purchased in 37 of the 50 states."

"Other than some locally produced cement and reinforcing steel, everything it takes to build a building is imported—everything—and we import the bulk of it from the U.S. All the electrical equipment from heavy switchgear and transformers down to cable, receptacles and light switches. We even import furniture and linens from the U.S.," Turner says.

"On one of our projects, the architect is Swedish and the specifications are written around British and European standards, but we're finding it more attractive to buy U.S. materials, and they're approving them."

In Saudi Arabia, typically, purchasing decisions on materials and equipment that make up 50 percent of the total project value are in the contractor's hands and though most contractors buy heavily in their home countries, almost all buy to some extent from the United States.

From such figures it is clear that profits for these American companies working in the kingdom are impressive. But their presence means even more for the future than it does for the present. Between 1976 and 1980, payments to contractors in Saudi Arabia will probably average $16 billion *a year*, compared to a 1975 figure of about $3 billion. And assuming American companies can stay in the race they could expect a share.

"For one thing," Turner explains, "I think the government agencies in Saudi Arabia tend to look West, to the United States. The softening of the Saudi Government requirements for performance guarantees and bid guarantees certainly worked more in favor of the American companies than anyone else, and, I think, was intended to do so."

Whether Saudi Arabia will continue to look to the United States is, of course, debatable. As in Kuwait, the United Arab Emirates and other Arab countries, competition in Saudi Arabia is fierce. Saudi Arabian officials, furthermore, like those in neighboring countries, have expressed concern about possible restrictions that would bar or reduce U.S.-Arab trade. But if American firms hold their present share of the Saudi contracts—and if no restraints on their ability to operate in the Arab world are imposed—many American businesses and industries can reasonably expect an economic bonanza.

In-kingdom studies show, for example, that every million dollars worth of construction contracts awarded to an American company will probably mean $400,000 in exports to U.S. suppliers of

construction materials, equipment and services. These studies also show that the U.S. can reasonably expect to have exported—between 1976 and 1980—more than $18 billion worth of construction needs to the kingdom—in uninflated 1975 dollars. And that $18 billion in exports could amount to $8 billion in national income during those five years and amount to an average of 170,000 jobs over the period.

That, furthermore, is only from construction-related exports. With exports of consumer goods added, the total export figure could jump to about $22 billion and the jobs total proportionately higher.

Those estimates, it should be said, are conservative; they do not include the earnings which Americans send back to the U.S., or the profits which American companies send back.

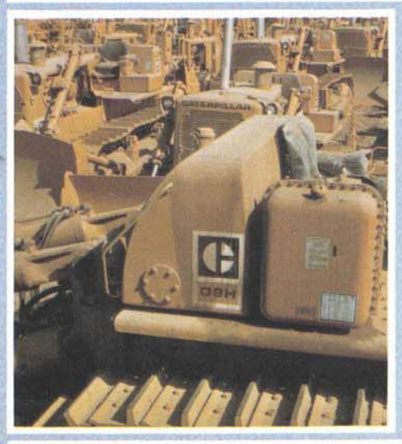
The overall economic benefit derived by Americans may be much larger, particularly if American firms compete more effectively. In this vein the Saudi Minister of Commerce, Dr. Soliman Solaim has said that "By 1980, of the expenditures under the five-year-plan, as much as $40 billion could be spent in the United States on projects and on consumer goods." And an official of the United States Department of Commerce calculates that every $1 billion of additional exports may even mean as many as 75,000 additional American jobs.

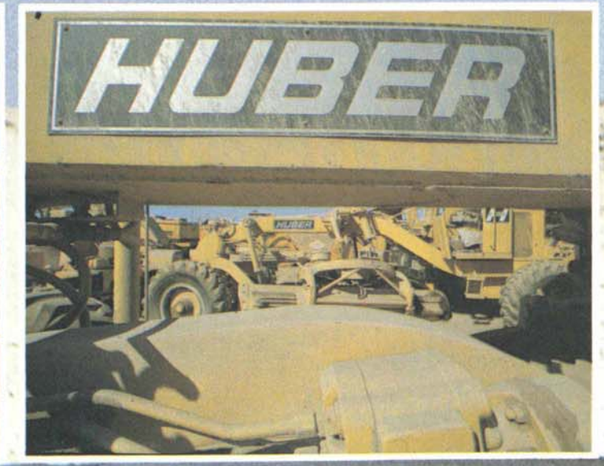
"The further you look ahead, though, the more interesting the situation gets," says an American economist working in Saudi Arabia. "Industrial development is the motor of this economy now, but spending for that purpose is going to peak around 1985. Spending is going to shift into operating all those new projects, and into consumer products." Thus every project built now with American installed equipment is a long-term future source of American sales of spare parts, replacement parts and equipment. Every project constructed now on the basis of American designs is a potential source of a larger volume of future business.

The Houston architectural firm of CRS Design Associates can testify to the validity of this view. CRS designed the stunningly beautiful campus of the University of Petroleum and Minerals in Dhahran only a few years ago—a $50-million project. Since then, they have been called on for another $200 million worth of buildings, and a third phase of expansion will come to a similar amount. And the word has spread: since the campus was completed, the firm has won a further $6 billion worth of business in Saudi Arabia and Kuwait.

American direct investment in Saudi Arabia is also important both in its scale

Fresh from U.S. factories specializing in major construction equipment, fleets of bulldozers, backhoes, scrapers and other heavy-duty vehicles are pouring into Saudi Arabia to provide construction muscle for the kingdom's vast and varied projects. Those projects range from new harbors to petrochemical plants and refineries, and include two cross-Peninsula pipelines.





Partners in Growth...

As the development program statistics in Saudi Arabia are sometimes too big to grasp, some smaller figures may help to bring them into focus:

- One company paid out more than $2.5 million via U.S. travel agents for airfares alone during 1976 to keep up with the Saudi Arabian projects under its supervision. One fifth of that was for travel within the U.S. An additional $130,000 was paid in U.S. postage.
- Mini-cities to house construction workers—some 27,000 of them—are being planned by Holmes & Narver, Inc., in Nevada, within hearing distance of Las Vegas' famous Strip. Each will accommodate 4,000 to 10,000 workers, will be complete with recreational facilities including swimming pools, and will draw supplies from at least 30 states. Orders totaling $130.1 million had gone out from Las Vegas by the end of 1976. Examples: 36 128-man dormitories (California); 441 poolside lounge chairs (Tennessee); 9,000 complete sets of dinnerware (Pennsylvania); 1,760 bunk beds (New York); 4,416 bath towels (North Carolina); assorted spare parts for bread slicer (Maryland); three barber shops (California).

and its implications for the future. Minister of Industry and Electricity Dr. Ghazi al-Gosaibi divides the Saudi industrialization program into two parts.

"The sector which private enterprise is undertaking will include about 800 medium and small manufacturing units. Some 10 or 15 percent of them will be joint ventures with Americans," he says. "In the large government part, almost all the large petrochemical and aluminum projects are with joint-venture partners.' He named several world renowned American firms. "They are going to participate in the equity and most likely in the engineering. Part of the construction will also be American, I expect." Thus some American firms will profit from their direct investments, others from the engineering and design work the projects

call for, still others from the huge volume of construction work that the future holds while a fourth, far larger group of American enterprises will supply the efforts of the first three, providing everything from drafting paper to steel plate to expert advice.

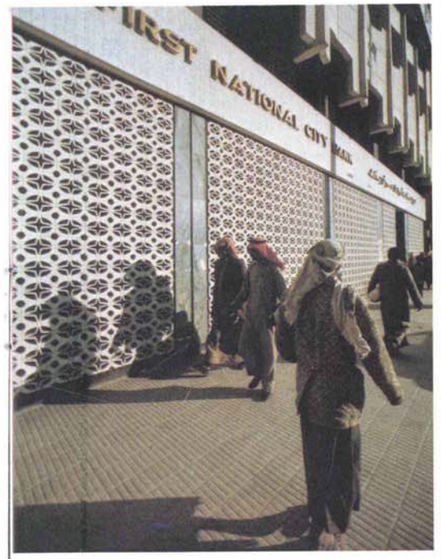
In some cases, the minister says, Saudi Arabia is better off dealing with American firms, notably in the area of petrochemical ventures. "They have the processes, the markets and the experience and have proved more willing to invest their own money, and have greater liquidity than European or Japanese firms."

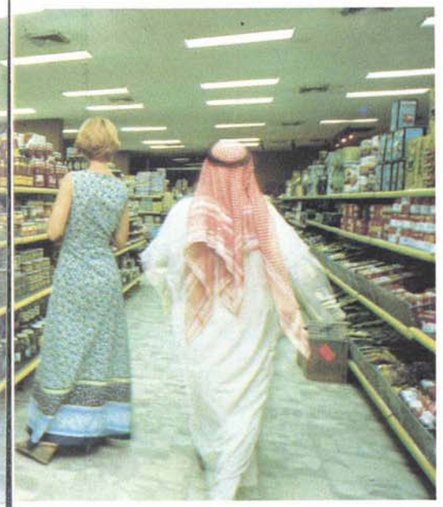
"But," he adds, "in the case of the vast majority of goods and services we could get them elsewhere. Nothing in this world is indispensable: if you have to do without something, you manage to. As for our industrial projects, I cannot think of any one that would be crippled by non-participation of the Americans. It could be delayed, might be impaired, but not crippled. Certainly not."

All of the large joint-venture projects the minister was talking about, and many of the private industrial projects, will lean heavily on Saudi Arabia's copious supplies of gas which will be used as a raw material, as fuel, or—converted to electricity—as power once the gas-gathering system is completed.

The conversion of part of that gas to power, and indeed the SCECO electrification of the entire Eastern Province, with all its present and future industry and population, is another large government project being carried out by

As an off-shoot of industrial growth in Saudi Arabia, and American participation in it, some areas in the kingdom already have American-style houses, banks, super-markets, appliances and even fast-food restaurants.





...Some Services

- A food-storage ship loaded at Norfolk, Virginia, last July now stands off Dammam in Saudi Arabia with 6.2 million pounds of supplemental food for American construction crews. A few of its contents: 536,000 pounds of frozen chicken; 548,000 pounds of vegetables, and 70,000 pounds of TV dinners—and 236,500 pounds of cola-drink syrup.

- Twenty-two Saudi Arabian programs are being helped by U.S.-Government personnel under the auspices of the U.S.-Saudi Arabian Joint Commission on Economic Cooperation, less than three years old. Examples: A five-year project to develop a census system (with almost $8 million funded for the first two years); a two-year study of highway-development needs ($4.7 million); a program to provide vocational schools and U.S.-trained Saudi instructors ($23.1 million for its first phase); Roughly 80 U.S. families are maintained in Riyadh to help coordinate the technical-assistance programs. Saudi Arabia reimburses the U.S. for all costs—using funds it has placed in trust with the U.S. Treasury.

Aramco. The design of the 230-kilovolt backbone of the system is by Black and Veatch of Kansas City and the prime contractor, the L. E. Meyer Company, is also an American firm, with a contract valued at almost $300 million. The gas program, the electrification project and Aramco's own long list of current and contemplated projects comes to a total value of over $15 billion, with a large portion of the spending in the United States. In 1976 alone, the company spent $740 million in the U.S. for materials.

"It proves that not only the big multinationals, but small firms too can succeed in business in the Middle East."

The development of Jubail into an industrial city of 250,000 is another large part of the development program which Americans are handling. So is the similar project across the country at Yanbu'. So is the 800-mile cross-country natural gas liquids pipeline to link Yanbu' with the Eastern Province oil fields—a pipeline longer than the Trans-Alaska pipeline—and a 48-inch, $1.5 billion crude oil pipeline running parallel to the gas pipeline. As well as the design and construction of many of the industrial projects across the kingdom that will be fed from the pipeline. According to the U.S. Department of State, 28,000 Americans currently live in Saudi Arabia and at least that many more could come later to lend their knowledge and their muscle to the kingdom's development plan in the next five years.

"I have lived and worked in Saudi Arabia for the past 30 years," says Aramco's Chairman of the Board, Frank Jungers, "and I've witnessed the country's tremendous growth in all fields—a growth almost unparalleled in modern times. That growth has been accompanied by increasingly close ties between the United States and the kingdom.

"Now Saudi Arabia and other Arab countries are on the threshold of even greater industrial development that will require greatly increased imports of goods and services from abroad. Barring artificial restraints on its own companies, the U.S. can expect to be a major supplier in this development program, while Saudi Arabia, with its huge oil reserves, will be a vital source of a large part of the oil that America's industrial economy needs. The points of contacts between Saudi Arabia and the U.S. are so many, and the economic ties so close that numerous Americans will benefit, however indirectly, from what is now happening in Saudi Arabia." In sum, a partnership. A loose, informal partnership in which mutual needs can stimulate mutual growth.

Among the numerous projects that will be part of Saudi Arabia's industrial infrastructure are (1) the seawater desalination plant in al-Khobar in the Eastern Province; (2) new facilities at Abqaiq and (3) Ras Tanura; (4) a gas processing center at Berri. In Dhahran (5) Aramco is building a new multi-story administration building and at Jubail (6) construction of a new port is underway.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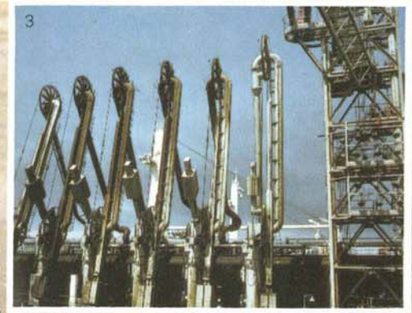
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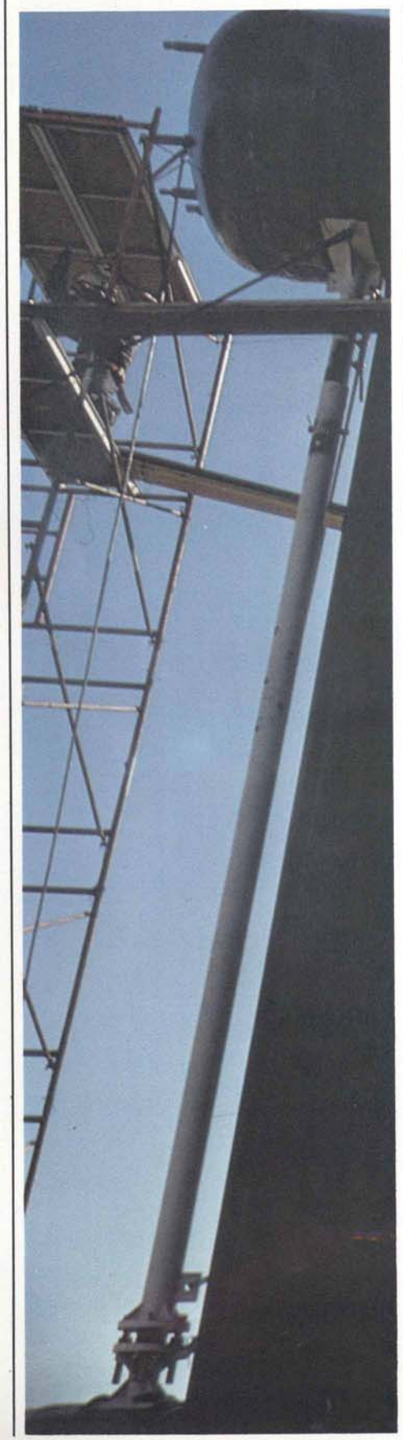
Partners in Growth: The United States 1

...that flow of materials and equipment was coming to Saudi Arabia from virtually every one of the 48 continental states...



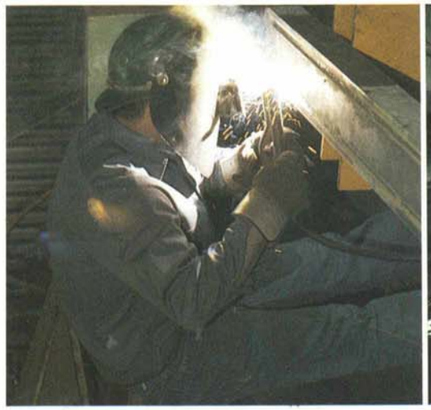
For the United States, still wincing from its recent recession, and newly buffeted by a savage winter, Saudi Arabia's now-famous five year plan for development promises a helpful infusion of money and, to many communities, jobs.

The kingdom's projected expenditures alone are impressive enough: a total of $115 billion for both government and private projects. But to countries still facing the high unemployment left by the recession, the potential impact of such expenditures is even more important: they can sustain and create jobs.

Economists, to be sure, often disagree on matters as complicated as employment and unemployment. But they generally agree that each billion dollars worth of exports maintains or adds thousands of jobs throughout the world. If, for example, the $68 billion earmarked by Saudi Arabia for just construction-related imports were to be spent in the United States, it could provide from 600,000 to 1,000,000 jobs in exporting industries and the satellite industries.

Saudi Arabia, of course, is under no compulsion to spend such sums in the United States; as in other Arab countries where multi-billion dollar programs are underway, European and Asian companies, with the full backing of their governments, are providing strong competition.

Companies in the United States undoubtedly have some advantages too: the 40-odd years of American experience in Saudi Arabia. On the other hand, they face the worrying possibility that restraints might be imposed on them. Such restraints could not only offset those advantages—and blunt their competitive edge—but also dam the flow of exports that, in 1977, was helping the American economy.



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Among the thousands of American workers kept busy on Saudi Arabian projects are: (1) Joe and Bob Chumchal at Hudson Products, Beasley, Texas; (2) Maria Luisa Vasquez, installing a rotor at the Byron Jackson Pump Division in Vernon, California; (3) Charles Zimmerman, a machinist and (4) Patty St. Clair, working with diodes, both at Bently Nevada, in Minden, Nevada; (5) Ramon Hernandez, making electrical connections at Byron Jackson; (6) Gilbert Buenes, crating valves in North Birmingham, Alabama, and (7) Colene Perry, assembling a monitor at Bently.

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In 1976, that flow—of materials and equipment—was coming to Saudi Arabia from virtually every one of the 48 continental states. Westinghouse, for example, supplied 14 gas turbines built in Pennsylvania; Fisher Controls shipped 1,650 control valves from Iowa and Anderson Greenwood, 2,800 relief valves from Texas; Bingham Willamette sent 464 pumps from Oregon and Allis Chalmers 4,300 electric motors from Wisconsin. There were also compressors, 113 of them, from the Elliott Company in Pennsylvania, Dresser-Clark Industries in New York, and De Laval Turbine in New Jersey.

Those shipments, furthermore, were only a part of the total. Altogether shipping charges for Aramco projects—ranging from 2,825 tons of heavy lift cranes to 37,000 pounds of Oreo cookies—came to $96 million, 6.4 times the cost of shipping the 1974 tonnage.

And even those figures pale by comparison with what's likely to follow. The $68 billion slated for construction-related imports will bring in 79 million long tons of imports.

Not all of those imports will come from the United States, of course, and not all of the jobs that such imports could provide will be generated in American companies. Nevertheless, Saudi Arabia has entrusted supervision of a considerable part of its building program to American companies and the U.S. Army Corps of Engineers, and those organizations, in turn, have enlisted the help of such engineering/contracting giants as Fluor Corporation, Bechtel Corporation, Ralph M. Parsons Company and Brown and Root, Inc.—all United States based.

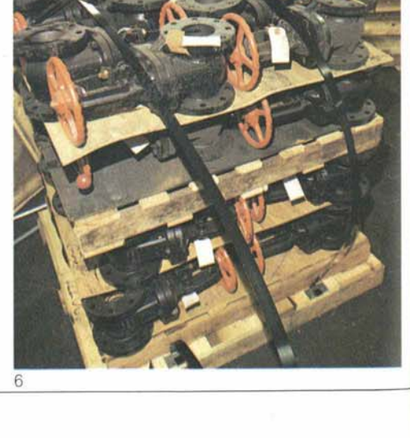
More than 5,000 representatives of major contractors for example, are already at work on the Aramco projects being designed in the United States. American specialists in Fluor's Houston office are expending some 70,000 manhours a week on the Eastern Province gas-gathering program. And Bechtel's Houston office has about 300 specialists there assigned to such projects as the 800-megawatt Ghazlan power-plant, a $370-million job that will pay for 600,000 American manhours in home-office work by the time it is completed.

The impact of the development program will extend far beyond the initial contracts, however. At materials-procurement time, for example, most engineers quite naturally specify those materials with which they're most familiar. "We create economic impact when we write our specifications," says a high-ranking official of an engineering firm. "Because we prefer American-made materials and we do our best to get them—in the face of pretty stiff competition, too."

Furthermore, he says, American equipment installed at the infrastructure level has a way of breeding requests for similar and compatible equipment as a project grows. And those requests can be expected to carry on into the development of private sector industry.

The pivotal gas-gathering project provides a clear example of that impact. As an Aramco senior engineer put it, "one purchase order for that program was worth $500 million, and it will all be spent with American manufacturers."

Like many of the kingdom's projects, the gas-gathering project, creating needs as it goes, is having an impact from coast



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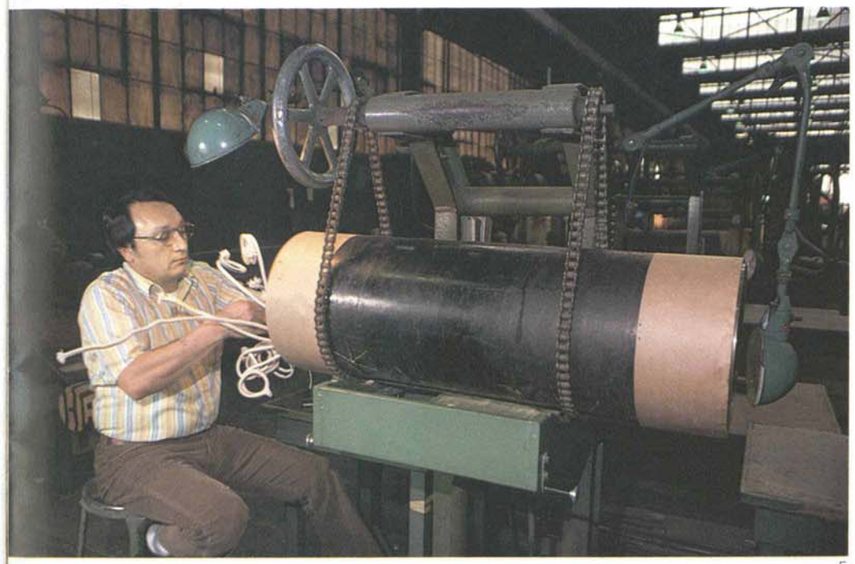

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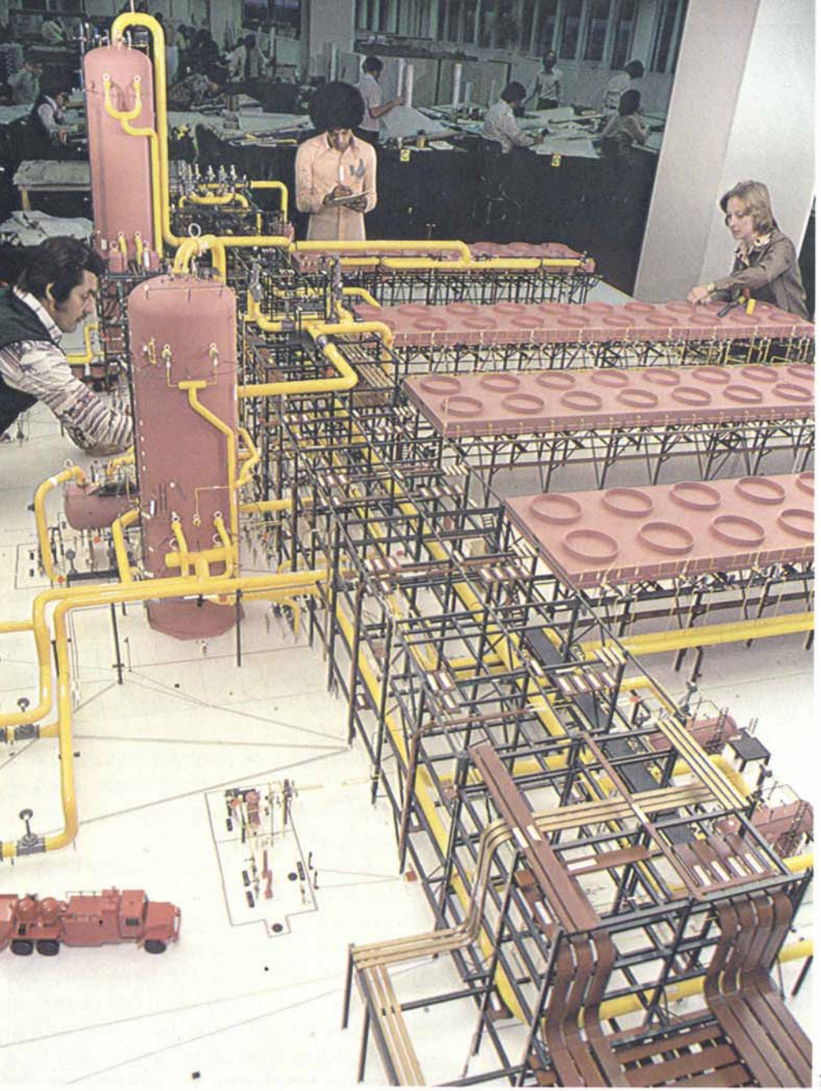
to coast in the United States. The building of the NGL (Natural Gas Liquids) centers are being designed and managed by major American companies and will need instrumentation from California, compressors from Pennsylvania, boilers from North Carolina, heat exchangers from Texas, 30,000-hp motors from New York and vibration sensors from Nevada—to list but a few—and well over $100-million worth of construction equipment, all of it from the United States. Each of those orders will generate purchases, manufacturing and wages.

Jubail is another example. Bechtel, headquartered at San Francisco, holds a multi-billion Saudi government contract to oversee construction of an industrial park at Jubail. At the same time, the Ralph M. Parsons Company, based in Pasadena, California, has a $6.5 million contract to draw up the master plan for a similar complex on the other side of the Peninsula: the Red Sea port of Yanbu'. Yanbu' will have extensive additions to its port facilities and, eventually, an industrial base.

The gas-gathering and processing project will be linked to Yanbu' by an 800-mile pipeline—designed and engineered by an American company—through which natural-gas liquids will flow to the industrial complex that will be made to grow in Yanbu'. Paralleling that NGL line the width of the Peninsula will be the 48-inch crude oil pipeline which will also be designed and engineered by an American company.

The capacity of these pipelines is considerably greater than the projected requirements of Yanbu'. The crude line, for example, will be equal in size to the



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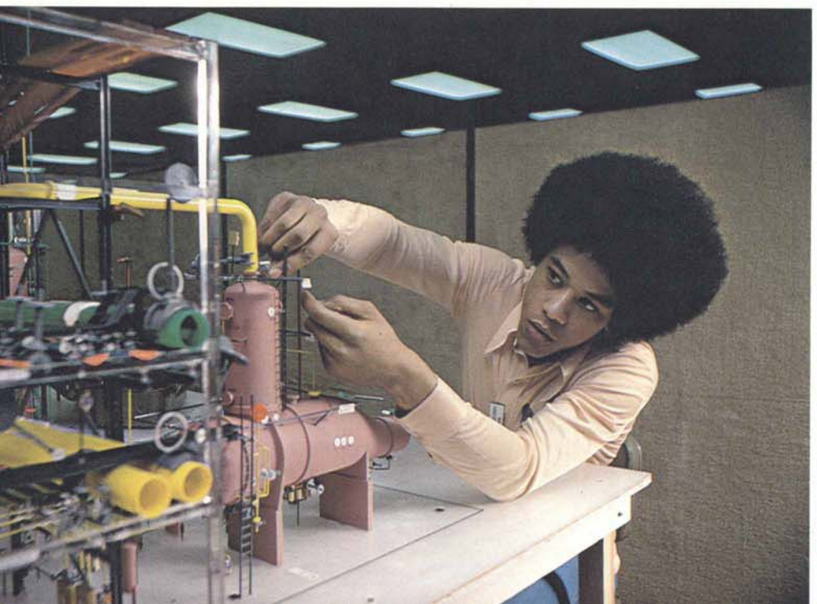

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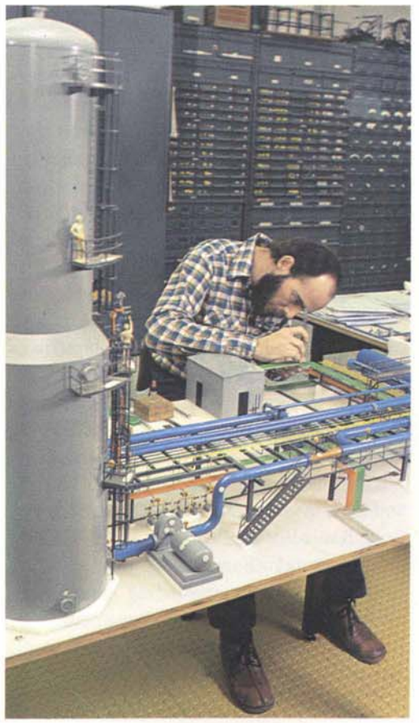
Segments of the pivotal gas-gathering project are already taking shape in the form of exact-scale plastic models. Shown here are: (1) and (2) a model of one of seven gas treating modules to be built at Shedgum and Uthmaniyah as part of the gas plant; designers are Fluor Engineers and Constructors, Inc.; (3) a model of a condenser for Berri; (4) a model of the Ghazlan power plant and (5) the seawater treating plant for Qurayyah, both being designed by the Bechtel Corporation.



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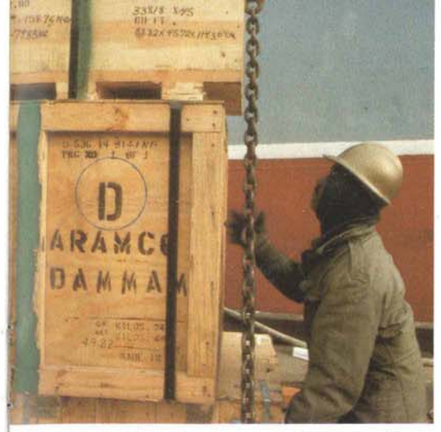
Those shipments, furthermore, were only a part of the total. Altogether, shipping charges ... came to $96 million ...



At numerous seaports in the United States today, Saudi Arabia's development program is filling holds with shipments of American-made goods. Shown here are the ports of Mobile and Galveston where freighters bound for the Arabian Gulf and the Red Sea load cargo as disparate as fiberglass pipe and drums for chemicals.

Trans-Alaska Pipeline and capable of pumping better than 2 million barrels of crude oil a day, some of it for export.

Pasadena-based Parsons has lined up a prestigious roster of American firms to get Yanbu on stream: Arthur D. Little, Inc., of Cambridge, Massachusetts; Skidmore, Owings and Merrill of Los Angeles; DeLeuw, Cather International of Chicago and Tetra Tech, Inc., of Pasadena.

More made-in-America equipment is going into the projects being supervised by the Corps of Engineers. Parsons, for example, is building Saudi Navy facilities at both Jubail and Jiddah, as well as the Navy Headquarters at Riyadh. And a number of American companies—including DeLeuw, Cather; Perkins and Will of Chicago; The Architects Collaborative of Cambridge, Massachusetts; Blount Brothers of Montgomery, Alabama, and J. A. Jones of Charlotte, North Carolina—have part, or have had part, in designing and building facilities at Khamis Mushayt, Tabuk and elsewhere in the kingdom.

American exposure to—and in—the Middle East counts heavily in winning contracts. The Architects Collaborative, for example, first went into the Middle East in 1957 with a contract to design the University of Baghdad Campus. Now a good 50 percent of its work is in Abu Dhabi, Bahrain, Kuwait, Oman, Qatar, and Sharjah, as well as Saudi Arabia. The firm has also established Middle East headquarters in Kuwait.

Or consider the rewarding experience of Ward School Bus Manufacturing, Inc., of little—pop. 15,510—Conway, Arkansas. Late in 1975, Ward completed its first export order: 700 specially modified buses, each built on a specified International Harvester chassis, for shipment to Jiddah. Essentially 66-passenger school buses, these were modified to meet the special needs of Muslim pilgrims. Now these buses are shuttling pilgrims between the Jiddah port and the Holy Cities of Mecca and Medina.

For Arkansas, that job was worth $20 million and something like 147,000 man-hours of work. But that was only a starter. As a direct result of that toehold in the Middle East, says company president Charles Ward, the firm is now assembling, under a $54-million Egyptian contract, 1,600 public-transit buses for use in Cairo and Alexandria.

The Egyptian order—fully 25 percent of Ward's typical annual production—means roughly 336,000 more man-hours of work for Ward and, obviously, some additions to his 800-employee work force before it's finished.

Just as important, though, is an attitudinal change the Saudi order brought to Conway. As part of the original agreement Ward sent 14 of his Conway mechanics to Jiddah to ready the buses for the road and to instruct selected Saudis in their repair.

Several among those 14 had not previously travelled beyond the Arkansas borders, says advertising director Bill M. Ward, and many were fundamentalist Protestants. But after nine weeks in Jiddah they came away with a strong respect for the Islamic culture and mores and warm memories of friendships with the Saudis they worked with. Back in Conway, where they had become celebrities of sorts, several addressed

school and civic clubs and always lauded Saudi friendliness. "As a result," says Ward, "I'll bet there isn't a town Conway's size anywhere that has a greater awareness and appreciation of Saudi Arabia."

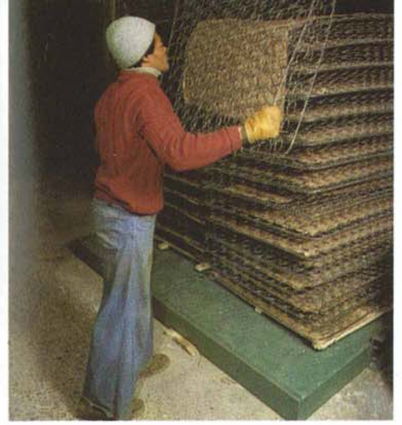
And for Ward Bus, there's still more. Ward is now working toward a joint venture with a Saudi Arabian partner to establish a bus-assembly plant in Jiddah to serve the entire Middle East. He'll ship motors, chassis and parts from Conway and—most likely—a few enthusiastic Conway workers as well.

American efforts to meet the Arabian Peninsula's special needs have paid unexpected dividends in accelerating the application of modern systems. In meeting the needs for trained manpower, for example, some American companies closely involved with development have had to turn to automation at an accelerated pace.

And manpower *is* a problem. Out of the approximately seven million people in Saudi Arabia the effective work force is estimated at less than two million—roughly the population of Newark, N.J. Those in charge of projects, therefore, have had to either import foreign labor or stress automation. Engineers planning the gas-gathering project, for example, have had to devise ways to tie the project's widespread stations together electronically so that, once the system is operational, one man can sit at a computer console in Dhahran and regulate or monitor a given valve's performance hundreds of miles away. "It's expensive, yes," says a planning engineer, "but it's the only way when you're short of manpower."

There are numerous other examples

IKS warehouses...have been made into a marshalling center for Middle East furnishings. Furniture makers in North Carolina, Michigan, Indiana ...ship their finished orders there.



too. One is an innovative construction technique to improve the housing of Aramco's bachelor work force. International Systems, Inc. of Mobile, Alabama, is supplying the company with over 1,000 prefabricated reinforced-concrete building modules to be used in erecting five story buildings at Abqaiq and Ras Tanura. The modules—in effect self-contained efficiency apartments—come complete with installed plumbing and fixtures, wiring and other components for simple, rapid building-block assembly. I.S.I. expects to export to Saudi Arabia for the next several years nearly all of the production from its 50-acre factory site.

Still another example is a building method developed by a Jacksonville, Florida building-industry engineer. Now being used on a 190-unit, 12-story luxury apartment building in Dammam, the method—introduced by an inventive engineer named James K. Strickland, president of Strickland Systems, Inc.—relies on a reusable "flying" form custom built for molding concrete building modules. Flexible—and mobile—the forms can be lifted away from, say, the poured deck of the 10th floor and "flown" by crane for use on the next-to-be-poured 11th floor. Similar forms are used for vertical modules and, as all are collapsible, they can easily be transported from one job to another.

The Dammam building is being constructed by Beck Arabia, a division of Dallas-based Beck International, for a Saudi firm. Beck engineers say the Strickland forming methods are expected to reduce its construction time to two years from a more customary three and a half years and—equally important in materials-short Arabia—reduce the quantities of forming materials that must be shipped in. "That one order means about $1 million to my business—not bad for a 35-employee company," says Strickland.

It is also another example of how one contract can funnel benefits into the United States. "I rely heavily on five sub-contractors," Strickland says, "and just think what it means to them. Even the guy who packed those forms for shipment got $56,000 for his work. Then we had to truck them to Panama City, load them on barges bound for New Orleans, then reload them on ships going out to Dammam. And somebody made money every step of the way."

Strickland's is a business view, of course. His flying forms save materials, shipping costs, manhours and construction time which, for a building program as extensive as Saudi Arabia's, adds up to a tidy sum of money saved. But for the construction industry it also means another step forward.

Saudi Arabia's hotel shortage has also stimulated advances as several American hotel chains—Inter-Continental, Sheraton, Holiday Inn, Hyatt, Hilton and Marriott—race to establish footholds in the Middle East. All have made inroads but, along the way, have found it extremely expensive not only to build hotels but also to furnish them. At least they did until Inn Keepers Supply (IKS) of Memphis, Tennessee—a Holiday Inn subsidiary—came to the rescue with a proposal to furnish any hotel or housing unit—not only Holiday Inn—that buys its service. "You see," explains an IKS spokesman, "it takes from 900 to 1,000 manufacturers and distributors to provide everything one hotel needs. So we simplify the procedure. We do all the buying and offer each hotel a one-stop shopping service."

Admittedly, IKS still faces stiff competition from European suppliers to the Middle East. Nevertheless, IKS is now furnishing everything from a 2,000-piece specially-built crystal chandelier to paper doilies for a 200-room yacht club and a Holiday Inn going up in Sharjah—plus a 200-unit Jiddah housing project and a 400-room Holiday Inn in Bahrain.

The IKS system is at once fascinating and instructive; it shows, again, how the Middle East building boom filters into the United States. IKS warehouses in Memphis have been made into a marshalling center for Middle East furnishings. Furniture makers in North Carolina, Michigan, Indiana or whereever ship their finished orders there. All other supplies—linens, paper goods, soaps, the always-at-hand Holiday Inn flyswatter—are stored there. When shipping time comes, everything—everything—the hotel needs is repacked and recrated and trucked over to Mississippi River docks. There the crates are fitted onto LASH barges like so many jigsaw-puzzle pieces and towed downstream to the port of New Orleans for lighter-aboard-ship handling. Like the containerized railroad cars that can be loaded on ships, the barges are plucked from the water by heavy cranes and loaded in their entirety onto specially adapted LASH ships. Their contents, so carefully packed at riverside docks in Memphis, are not touched again until the crates are off-loaded and unpacked at their final destination. As breakage and pilferage are reduced, along with shipping costs—savings of roughly $300,000 were achieved on each of the Sharjah jobs—IKS considers the system an open sesame to Middle East business.

It may turn out, in fact, that development of the Middle East will stimulate many advances in the housing and shipping fields. Anjean International Corporation of Houston, Texas is already creating "instant" hotels in Egypt and the Sudan now—largely because it has found a way to reduce building and shipping costs—and is negotiating for contracts on the Arabian Peninsula. Headed by W. Angie Smith, a former U.S. Foreign-Service officer with extensive Middle East experience, Anjean supplies hotel-room modules that can be literally bolted together into full-fledged hotels in short order. Each 12-by-52-foot module makes two 12-by-24-foot hotel rooms and a 10-unit commercial center comprises a lobby, a kitchen, dining room and house-keeping facilities. Each unit is fully furnished, fully plumbed, and complete "to the soap in the bathroom" *before* it leaves the U.S.

Built in the tiny town of Bean Station, Tennessee by family-owned Norris Industries, the modules are fitted with wheels, towed to the port of Mobile for shipment, put aboard 300-foot-long oceangoing barges, towed to their destination, offloaded and towed on wheels again to the erection site. The units can be stacked three deep on the barges—each barge can carry 292 rooms—and since barges are towed in tandem, each shipment can go out with as many as

Partners in Growth...An Interchange

As she scrambled under the dining room table to answer the telephone, Mrs E. H. Philip Smith of Los Alamitos, California sounded very, very busy.

"I'm sorry," she said from beneath the table. "I just don't have a moment to talk now. I'm still writing the inventory for the children's books and games. The packers are coming in an hour and I'm supposed to have everything we own listed and photocopied before they come . . . and the real estate people are coming too . . . they're showing the house already and they're due in 30 minutes. We're hoping to leave a week today, you see, so could we just . . ."

Mrs Smith—Zoe to her husband's former co-workers at Fluor Engineers & Constructors in Los Angeles—had good reason for sounding harassed. She and her children, ages 12, 14 and 15, were packing up to move to Saudi Arabia. Her husband had gone already—to join an engineering unit working on the kingdom's huge gas-gathering project—and Zoe was feeling the pressure that sudden uprooting can bring.

A number of people are these days. For as the proliferating demands of Saudi Arabia's massive development program begin to mount, thousands of people, both Arab and American, are packing up and heading for foreign lands. In the United States, some 5,000 young Saudi Arab students are studying in American colleges and universities while in Saudi Arabia some 28,000 Americans are helping to build an industrial society.

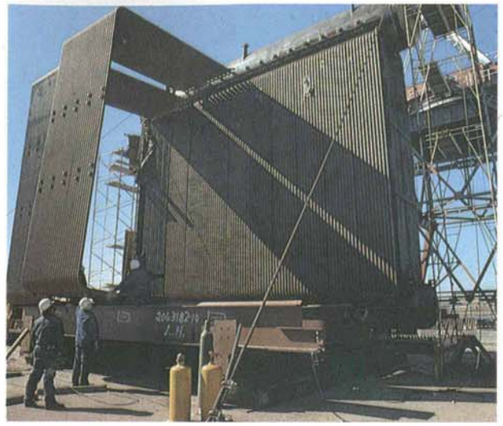
Most of the movement from the United States is under the sponsorship of major multinational companies—and almost has to be as small companies can rarely afford to send many men abroad.

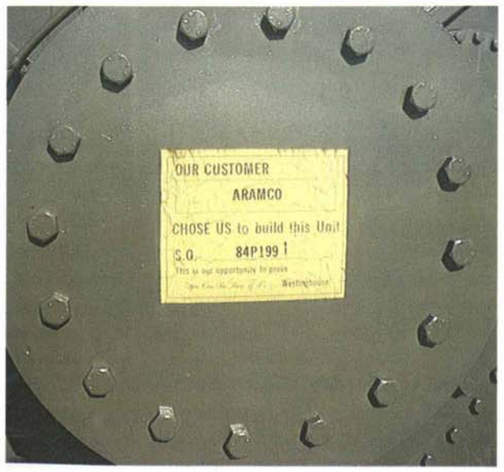
The interchange of personnel between countries, however, is usually worth the cost. For although it is undoubtedly difficult to settle into a totally different culture the interchange eventually breeds a better and deeper understanding of that culture. As one American wife said, on returning from a stint in Riyadh, "I'd never even seen an Arab before and now I feel I not only know them but have friendships that will last."

". . . so could we just set another time to talk?" Zoe Smith was asking. "What with the children having to go for physical exams and all of us getting shots . . . and selling the house . . . and packing . . . and putting things in storage . . . would you hold on a minute?"

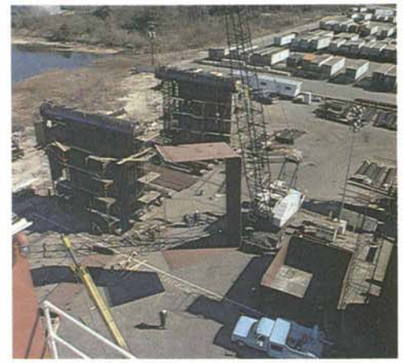
It was more than a minute but then she came back and resumed her litany of chores."—and I have the carpet cleaners coming too—which reminds me—I still have to pick up the dry cleaning." She sighed. "You know I'll never get it all done. We want to be enroute and in London a week from now—we're enrolling the girls in boarding school there—and I still have to get some summer clothes . . . and well, you know, it's all very exciting but please, could we talk another time?"

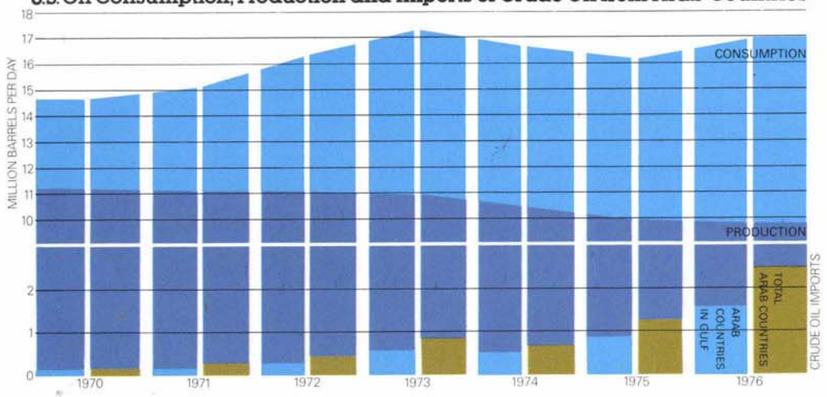
Which wasn't, of course, necessary. Mrs Smith already had said it all.





At the Wilmington port in North Carolina, Babcock & Wilcox assemble six furnace boilers for Saudi Arabia. The largest packaged boilers of their kind ever built by the company, they are nearly 42 feet high and 48 feet long and will weigh 308 tons with their accessories—the flues, ducts and structural steel plus one stack for each pair of boilers. Components for the boilers were made in Texas, Pennsylvania and North Carolina.





Partners in Growth..The Other Partners

The partnership in growth is not, of course, an actual partnership. It is simply an exchange; in which the complementary needs of countries can be satisfied.

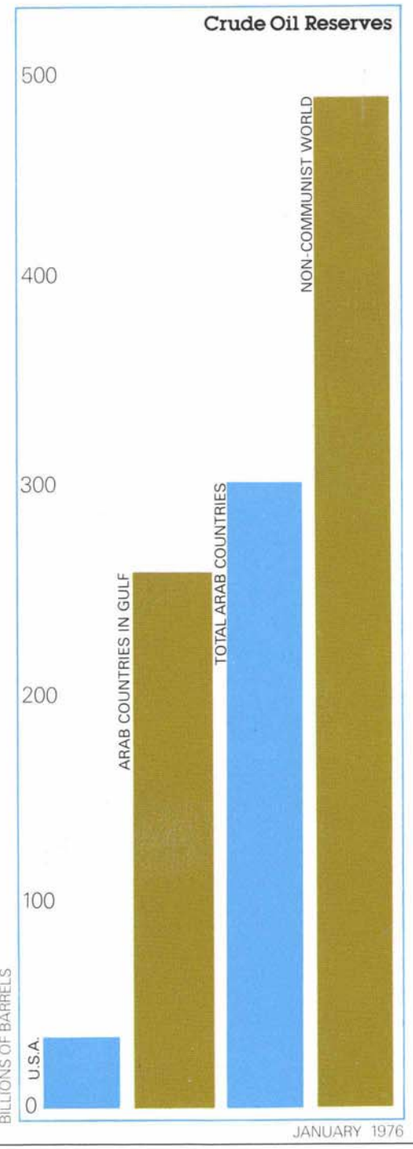
As this issue suggests, the Arab countries, today, need the technological know-how and the sophisticated products of the industrialized countries—and are turning to those countries to get them. But the industrialized nations have needs too: the fuel that keeps most of the world's economy moving.

In the early years of the 1980's, for example, forecasts suggest that the United States will import approximately 10 million barrels of oil daily. And those imports—an increase of three million barrels daily over 1976—will come mainly from the Arab countries. Even in 1976 the increase in oil imports originating in Arab countries exceeded the increase in total oil imports from all countries.

Furthermore, only a small part of future increases in U.S. oil consumption can come from America's own reserves—which, statistics show, are far smaller than those of the Arab countries or the non-Communist world. Arab countries in the Gulf, for example, have reserves nearly eight times greater and the Arab countries as a whole have reserves more than nine times greater.

From those reserves the Arab countries, and particularly Saudi Arabia, are supplying the fuel that the world economy needs. Indeed, Saudi Arabia is producing far more oil than it needs to. And in so doing is demonstrating its awareness of the interests of all its partners in growth—as Saudi Minister of Petroleum and Mineral Resources Ahmed Zaki Yamani explained recently in a discussion of that subject:

"We produce much more oil than warranted by our financial needs—and are accumulating vast surpluses in the process. Why are we doing so? The answer, simply stated, is because we have the interest of the rest of the world in mind. We are, in fact, following a policy which leans much more toward the interests of the consumer countries. Realizing that the oil we produce in excess of our needs is vital to the economic wellbeing of other nations, we have chosen to . . . accommodate the interests of those nations. This is one way in which we in Saudi Arabia try to demonstrate our constant awareness of the interests of other nations and our willingness to take positive and effective steps to protect them."



More than 5,000 representatives of major contractors...are already at work on...projects being designed in the United States.

584 hotel rooms.

One Anjean vice president says shipping costs run less than half those of conventional shipping methods. And further savings are achieved through use of shallow-draft barges that can be docked most anywhere and unloaded quickly. With hotel-building costs on the peninsula running high, Anjean's more spartan quarters become attractive indeed. The per-room cost estimate for proposed Anjean inn in crowded Jiddah, for example, is only $23,500—much of it flowing back to the workers in Bean Station.

Shipments to Saudi Arabia also caused a stir on the Great Lakes last year when, for the first time, Aramco shipped 81 fully assembled 145- to 280-ton cranes from the Lake ports of Toledo, Ohio and Duluth, Minnesota.

The 280-ton cranes—manufactured by Clark Equipment Company in Lima, Ohio and American Hoist International in St. Paul, Minnesota—were loaded by the usual roll-on/roll-off method. The 175-ton cranes were lifted aboard by the ship's own cranes and were shipped on shallow-draft vessels. Together, those innovations proved that self-loading vessels could handle fully assembled machinery weighing up to 175 tons, and that such machinery could be transported on shallow draft vessels able to dock in practically any port. Use of those systems opened the way for faster shipment of heavy equipment needed for the kingdom's development program. And as they also resulted in savings in money more cranes are being marshalled for shipments via the Great Lakes and the St. Lawrence Seaway.

Not all the effects of Saudi orders for development needs are so easily defined. Consider, just as one example, what's happening down in Beasley, Texas. Beasley is so small that visitors can't be quite sure whether they're entering it or leaving it. But it is where Hudson Products, a subsidiary of J. Ray McDermott & Company, makes the huge Fin-Fan heat exchangers used for industrial cooling needs around the world.

Fin-Fans run to 10 tons each in weight. Similar to gigantic automobile radiators, they can be—and are—used to cool just about anything that's fluid. They've been used for years in Saudi Arabia; fully 50 percent of Hudson's output, in fact, now goes into the Middle East. Beasley isn't overly aware of that; but Beasley is certainly aware that Hudson has come to town.

When, for example, the company moved its Fin-Fan plant down from Houston just five years ago it brought 250 employees with it, most of them Houston residents who commuted to the rather isolated plant site daily. Now, however, the Beasley facility employs some 600 Fin-Fan makers—skilled metal workers, machinists and welders—and few of them are Houston commuters. Now, they come from Beasley—or the nearby towns of Rosenberg, Wharton, East Bernard and Meadville—and most are farmers, or sons of farmers, who have learned new trades at Hudson.

Thirty-year-old Joe Chumchal, for instance, started at Hudson as a trainee three years ago, having worked previously on his father's farm and as a parts manager for a tractor dealer. Now he's a fitter and welder fast approaching the top-level welder's pay of $6.30 an hour. He and his wife Judy have one big dream—to build their own home—and have already used savings from Joe's Hudson pay to buy a 1.9-acre corner lot in East Bernard.

That plant is attracting trained outsiders to Beasley's rural environs, too. "Hudson has brought in some exceptional people," says W. J. Hlavinka, an East Bernard builder, hardware dealer, and tractor supplier. "Rural folk have a reputation for not being receptive to newcomers; but we like those who make a contribution to the community—and these do."

Hlavinka himself has benefited too. He has already built some 50 houses for Hudson employees and estimates that other builders have erected just as many—houses running between $40,000 and $60,000 in cost.

Nor does it stop there. East Bernard's Union State Bank could claim only $8,900,000 in deposits five years ago and only $4,100,000 in loans outstanding. But at the end of 1976, deposits stood at $20,300,000 and loans had practically tripled. The area's industrial payroll, moreover, increased by better than 20 percent during 1976.

What is happening in Beasley, however, is not extraordinary.

Indeed, it may typify what is happening in the nearly 48 states that have already received orders for goods and services to fulfill Saudi Arabia's development needs: one important contract that creates jobs, boosts income and, in ever widening economic ripples, stimulates growth.

Partners in Growth: The United States 2

...the Elliott Company in... Pennsylvania...whose operations typify the impact of Saudi Arabia on many companies–and communities–in the United States.

Out in tiny Minden, Nevada (pop. 500), where the snow-capped Sierra Nevadas reach down into lushly green Carson Valley, lathe-operator Ralph Jepsen helps produce something called a proximitor. It's an electronic device designed to sense and measure potentially dangerous vibrations in rotating mechanical equipment.

And across the United States, in Foxboro, Massachusetts, David Alger helps produce pneumatic and electronic controllers instruments whose job it is to measure and control the pressures, temperatures, and flows in giant turbines, pumps, processing plants and other facilities.

Chances are that neither Jepsen nor Alger has ever given much thought to Jeannette, Pennsylvania, or to Anton Kush, who lives there. Nor is it likely that Kush, who helps assemble big propane compressors, will ever run across Jepsen or Alger. More unlikely still is the possibility that any one of the three will ever find himself in far-off Saudi Arabia.

Yet Minden, Foxboro, and Jeannette —as well as Jepsen, Alger and Kush— are important to Saudi Arabia right now. And while they may be unaware of it, Saudi Arabia is important to them.

Here's why: the multi-billion gas-gathering project that lies at the heart of Saudi Arabia's ambitious $143-billion industrialization plan calls for the use of more than 100 compressors to condense and refine the gas and force it out to processing stations. Some will be produced in New Jersey, some in New York, and some in California. But 52 of the big ones—21,000 horsepower and weighing almost 200,000 pounds—are being machined and assembled by the Elliott Company in Jeanette, Pennsylvania, a company whose operations typify the impact of Saudi Arabia on many companies—and communities —in the United States.

The Elliott Company, to begin with, gathers in the components it needs from roughly 125 primary suppliers, many of whom supply the other compressor makers as well. Those 125, in turn, rely on hundreds of their suppliers to keep the Elliott-bound pipeline filled. And among those primary suppliers are Minden's Bently Nevada Corporation—whose sensitive vibration-monitoring probes have made the 21-year-old company Nevada's leading manufacturer of export goods—and Foxboro's Foxboro Company, unchallenged as the largest United States supplier of instruments and control systems for the oil and gas industry.

Which brings us back to Jepsen, Alger and Kush. Jepsen works for Bently Nevada, Alger for Foxboro and Kush for Elliott. All of them, as well as thousands of other wage earners, contribute to the Elliott compressors and—whether or not they know it—will share in the $60 million or so that Saudi Arabia will spend for those Elliott compressors. In a very real way they—and the companies they work for—capsule the impact of Saudi Arabia's development program on America and Americans. The program, in sum, affects countless individuals, numerous companies, most states any many cities and towns. All will be touched—or perhaps have been touched already—by the economics of it. For the Saudi Arabian expenditures will create a ripple effect in the economy. The ripple effect is created as Elliott pays that money out to its suppliers, they pay it out to *their* suppliers, all of them pay it out to Jepsens, Algers, and Kushs across the country, and those individual workers spend it with the grocer, the landlord, the TV repairman, the dentist or, perhaps, put some of it into an interest-paying savings account.

Even that is not the end. For the interest-paying institution may then lend the savings to a company that wants to expand, add more employees and, possibly, pay greater dividends—creating via its shareholders another avenue of economic growth. Or the financial institution may lend the money to a builder who would then be able to buy materials —on which his suppliers would profit—to construct a house on which *he* would profit.

And so it goes, the Saudi petrodollars —some ultimately earned through the sale of gasoline to those same workers—filtering through the economy: from employer to employee, employee to retailer, retailer to wholesaler, wholesaler to distributor and on to producer and the suppliers of raw-materials, benefiting in countless ways the many who handle it.

Jeanette, where Elliott puts its compressors together, provides a good example. A typical small factory town—pop. 15,200—lying about 40 miles southeast of Pittsburgh, Jeannette leans heavily on Elliott. For jobs primarily—Elliott provides 2,400 of the town's approximately 6,000 industrial jobs—but for other things too. Elliott, for example, once spearheaded a fund drive to build Jeannette's 100-bed District Memorial Hospital, helped build the city's Salvation Army Citadel—which operates a day-care center, adult recreational programs and a summer camp for children—and makes the company auditorium available for Boy Scout and civic club functions.

Elliott wasn't always that important to Jeannette; when it moved there in 1914 its total work force was 32. But over the years it grew, and with the compressor orders from Saudi Arabia stands to sustain its growth.

Those orders, as Elliott Comptroller John Weagraff makes clear, are important. In 1977 alone, for example, Saudi Arabia placed orders for compressors worth, roughly, $50 million in Elliott sales. That in turn requires 554 Jeannette-based workers and a payroll of $9.2 million. Most of that money represents a direct contribution to the local economy and should generate $2.3 million in federal and state taxes, including Social Security withholding. Furthermore, Weagraff figures, those 554 jobs should also generate $6.4 million in personal income, $2.8 million in bank deposits and $3.2 million in retail sales.

> *And those 20 men working on the Elliott order won't be going back to the unemployment lines.*

Something similar is happening over in Donora, Pennsylvania, about 25 miles away. Little Donora, embedded deeply in the Monongahela River Valley, made tragic news a while back as a company town that "died". That was in the 1960's when a U.S. Steel subsidiary phased out its 3,700 to 4,500 workers—practically Donora's total work force—and, in 1966, let the last six men go.

Actually, Donora did not die. By 1970 it had torn down the old steel mill, cleared the site and begun to build an industrial park. And by 1976 Donora was ready to go back to work when the Elliott Company moved its Lubrication Systems Division to it, partly, says an Elliott fact sheet, because Donora could satisfy the shipping requirements for Saudi Arabia's compressors

Today in Donora, some 125 workers are kept busy on compressor work, 67 of them on Saudi Arabia-bound compressor "trains." Working in a newly constructed high-bay unit fitted with a newly acquired 100-ton crane, they produce the compressors' lubrication consoles, assemble the major components into baseplate-mounted "trains", and crate the completed units for shipment. Each train, lubrication console, compressor, gear unit and motor—mounted in that order—makes up a package weighing 200,000 pounds.

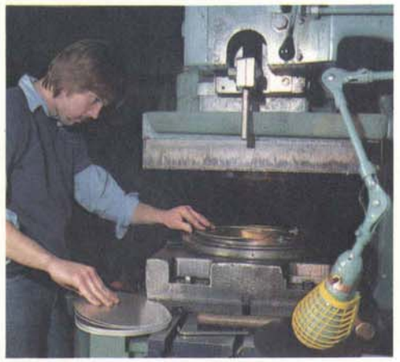
As in Jeannette, the impact of Saudi Arabia's development program is substantial. The Lubrication Systems Division expects to ante up $1.3 million for workers' paychecks this year, with perhaps 85 percent of that being charged against orders going out to Saudi Arabia. Much of the pay will go to previously unemployed workers whom Elliott has trained as welders and machine operators in a manpower-upgrading program for which the state and Elliott share costs. More Elliott money will go to Donora-based suppliers of the company's needs—such as Gutman Supply, which provides welding equipment and industrial gases and the local Sherwin-Williams outlet which stocks the turquoise and gray paints that cover the compressor exteriors. And some will go to such businesses as Eugene Muia's Green Grill, just a few blocks from the plant, which sells bagged lunches to workers.

> *Donorans are living better now than they ever lived before.*

"Donorans are living better now than they ever lived before," says John A. "Jap" Gorscak, a storeroom foreman in the lube division and a perfect example of how distant Saudi Arabia affects individuals throughout the United States. Gorscak, a bachelor, has bought himself a new car since joining Elliott last August, and is already talking of trading it for a more expensive one. "I like to make money, and I like to spend it," he says.

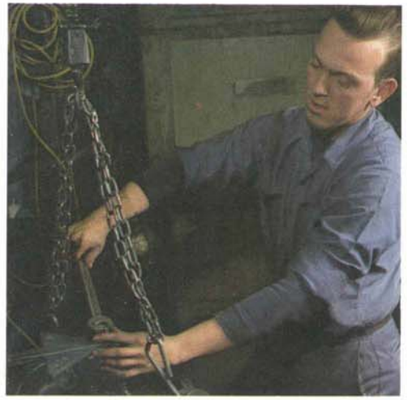
Another example is Betty Ferguson, a welder trained under the manpower program. A young divorcee, Betty is planning to buy the house in which she now lives with her two sons and her widowed mother—all of whom she supports. She probably will make a $1,000 down payment, she says, and pay the remainder of the $3,000 price in monthly installments over a three-year period. Knowing that she can work with the big compressors has given her the confidence needed to take on a sizeable debt.

In Erie, Pennsylvania, where something over $1 million of Elliott money is going to little Custom Engineering Company, the pattern is similar. Highly industrial Erie, a victim of layoffs in the locomotive and aerospace-parts industries, went into the exceedingly cold winter of 1976 with Pennsylvania's highest unemployment rate. And although Elliott's order—for the 66,000-pound steel baseplates on which its compressors



The Elliott Company of Pennsylvania—which assembles compressors for Saudi Arabia's gas-gathering project—and its suppliers, typify the ripple effect of Saudi contracts in the United States. Shown here: a rotor assembly (center) at Elliott; workers at the Industrial Gasket and Shim Co; Elliott's Lube Systems Division, the Abex Corp., Cann & Saul Steel Company and the Philadelphia Gear Corp.

Yet Minden, Foxboro and Jeanette ...are important to Saudi Arabia... And Saudi Arabia is important to them.



The Architects Collaborative... first went into the Middle East in 1957...

are built—could hardly offset unemployment completely, it did enable Custom to take on at least 20 men who were without jobs. It also enabled Custom Engineering—only a machine shop a year earlier—to expand into a fabricating facility. As a result, Custom is now fully assembling nine of the baseplates—each 10 to 12 feet wide and 50 to 60 feet long—and machining 31 others. With a loan from Erie's Union Bank—another direct result of the baseplate order—Custom invested $150,000 toward expansion. The resulting added capacity has doubled sales and Treasurer Ron Huff expects the 1977 gross to double as well.

Kraissl...holds an order for... transfer valves to be used with the Elliott compressors for Saudi Arabia.

"That one order gave us the confidence to go out and get others—orders we wouldn't even have tried for before," says Huff. "We're not going back to half production again. And those 20 men working on the Elliott order won't be going back to the unemployment lines."

That one order also gave Custom workers something more: $33,000 in overtime in the three month period ending just before Christmas, an average of $1,650 for each worker's efforts and a welcome addition that hourly employees count on for life's little extras. At Elliott, for example—where Sunday work means double-pay—overtime can run to $100 for the day. Which, says a 37-year-old Elliott veteran, adds up. This man, who now works with impellers and diaframs going into the Saudi Arabia-bound compressors, says proudly that overtime has given him a mortgage-free house. "Paid it off by doubling up on the monthly payments." he says. "And I've raised six kids here, too."

Overtime, in fact, is relatively common at plants working on the compressors and Elliott expects to pay at least 10 percent more during 1977, according to Vice-President for Manufacturing Paul Smiy, and most employees are delighted. To one 22-year employee, for example, overtime pay from the Aramco order has meant an investment in a four-acre lot on which he hopes some day to build and—something a bit more frivolous—a motorcycle.

Another compressor-components supplier that pays overtime is the Kraissl Company in Hackensack, New Jersey. "It's been a way of life for us for some time," says Robert C. Michel, the firm's President. Kraissl—which makes critically machined valves—holds an order for 160 three-way transfer valves to be used with the Elliott compressors for Saudi Arabia. That order, totalling $168,000, is roughly eight percent of Kraissl's 1976 sales. "It came at a peak for us, and we have no way of knowing just how much of our overtime can be attributed to it," says Michel; "but that doesn't mean our 65 employees are any less appreciative of it,"

Kraissl's valve orders mean orders as well to the company's 25 or 30 primary suppliers—particularly to the three steel-casting foundries making the Elliott valve housings. Those three are Arrow Foundry in Holyoke, Massachusetts, Empire Steel Castings in Laureldale, Pennsyl-

Partners in Growth...Some Planners

Although construction accounts for a large proportion of the contracts awarded to American firms, design supervision and other services are also important. Some examples:

- The kingdom's Saline Water Conversion Corporation has awarded a $90-million contract to an American firm to supply engineering services and supervise construction of a desalination plant at Jubail.

- An American architectural firm has the planning and design contract for the Faculty of Medicine and Health Sciences at King 'Abd al-'Aziz University at Jiddah—a $500-million project.

- A Dallas firm has won a three-year, "multimillion-dollar" computer service consulting contract with King 'Abd al-'Aziz University.

- A San Francisco geotechnical and environmental consulting firm has a subcontract with Skidmore, Owings and Merrill to do studies of the site of a new campus in Mecca.

- Edward Durell Stone Associates of New York is doing preliminary work for a master plan for Abha, capital city of 'Asir province.

- A $200-million project to be built at Tabuk was designed by a St. Louis firm, and will incorporate a $1.5 million central solar heating system, the world's largest.

- Another St. Louis firm of architects had designed a new campus for the University of Riyadh—a $3-billion project.

- Waste Management, Inc., an Illinois form, has signed a five-year contract to provide city sanitation services for Riyadh, calling it "the largest contract for sanitation services ever entered into anywhere." The company expects revenues of $243 million from the contract, and the Saudi Arab Government is supplying the capital necessary for the project.

vania and Walworth Company in Greensburg, Pennsylvania.

The Elliott order, obviously, has been important to suppliers in Pennsylvania, particularly to manufacturers of steel and steel-related heavy machinery, traditionally centered in the steel-producing Pittsburgh area.

One is Lukens Steel Company in Coatesville, which traces its history to 1793 and claims to be the oldest privately owned iron and steel-plate producer in America. The nation's fourth largest steel maker, Lukens is working to complete an Elliott order that could run to $3 million.

Lukens' job is to turn out the steel plate and the barrel sections for the 17-foot-long compressor casings, including the barrel heads and the 6 to 12-inch thick horizontal flanges that hold the casings together. It was not a particularly large order for a company with annual sales of $252 million, but it was a significant one. The sale of steel plate was "not too brisk" when the order came in, said one company official. "And here was a job that called for use of our steel-making, head-making, and flame-cutting people." And also, he might have added, contributed wages to some of the 5,000 workers, and to the income of some 200 suppliers —such as scrap-steel broker Luria Brothers.

Another steel company, McInnes Steel, provides Elliott compressor impellers with hubs and caps from Corry, Pennsylvania, a town of about 7,500 lying 35 miles southeast of Erie. Elliott's order for the impeller hubs and caps comes to about $400,000, but McInnes can count on an additional $300,000 from the Saudi Arabia gas-gathering program; it's providing parts, in addition to Elliott's, for the even larger Dresser-Clark compressors being made in Olean, New York and for Koppers Corporation which, in effect, puts the final touch on Elliott compressors. Koppers' plant, in Baltimore, Maryland, fabricates the huge customized couplings needed to tie major units of the compressor train together. All in all, the McInnes Saudi Arabian orders come to about 3.5 percent of its total output for 1976.

"All of them, as well as thousands of other wage earners... will share in the $60 million... that Saudi Arabia will spend for those Elliott compressors."

Pennsylvania also produces the big high-speed gears needed to drive the Elliott compressors; they're made in King of Prussia, Pennsylvania by Philadelphia Gear Corporation. Philadelphia Gear employs some 1,200 workers—most of them commuters from nearby Philadelphia. The compressors' gaskets and shims, those essential tidbits, come from Industrial Gasket and Shim Company in Meadow Lands, Pennsylvania—which now calls Elliott its third largest customer —and the impeller forgings are done by Cann & Saul Steel in Royersford, Pennsylvania, in the Delaware River Valley area known for its forges even before the American Revolution. Compressor diaframs and some specialty machine screws have been cast by the Engineered Products Division of Abex Corporation at Mahwah in neighboring New Jersey. The Elliott order, for 900 diaframs in varying sizes, amounted to perhaps four percent of the division's 1976 total, enough to keep the 350 employees hopping at a time when foundry work nationwide was slow.

But Elliott suppliers are by no means limited to Pennsylvania—or even to the East Coast. The far west, for example, is more typically the origin of electronics devices and so far as Elliott compressors are concerned, that usually means Minden, Nevada, Bently and, in effect, Ralph Jepsen.

With 13 or 14 of its vibration-sensing probes needed for each Elliott compressor, and similar proximitors being produced for other gas-gathering machinery, Bently Nevada can count on roughly 10 percent of its $20-million 1976 output going into the Saudi Arabia program.

Given that level of technology, customers who visit Bently Nevada—whether from Jeannette, Pennsylvania, or Saudi Arabia—are surprised to find the company headquartered in what once was a creamery and flour mill. They don't realize, apparently, that Bently is a new firm and that approximately half of its 600 employees—up from the four Bently had when he moved to the valley 16 years ago—have joined the company within the last year. If new, however, Bently is important: its 600 workers funnel a $6-million payroll into western Nevada and —like all of the companies involved with Elliott, with compressors or with Saudi Arabia's development program—into many parts of the U.S. economy.